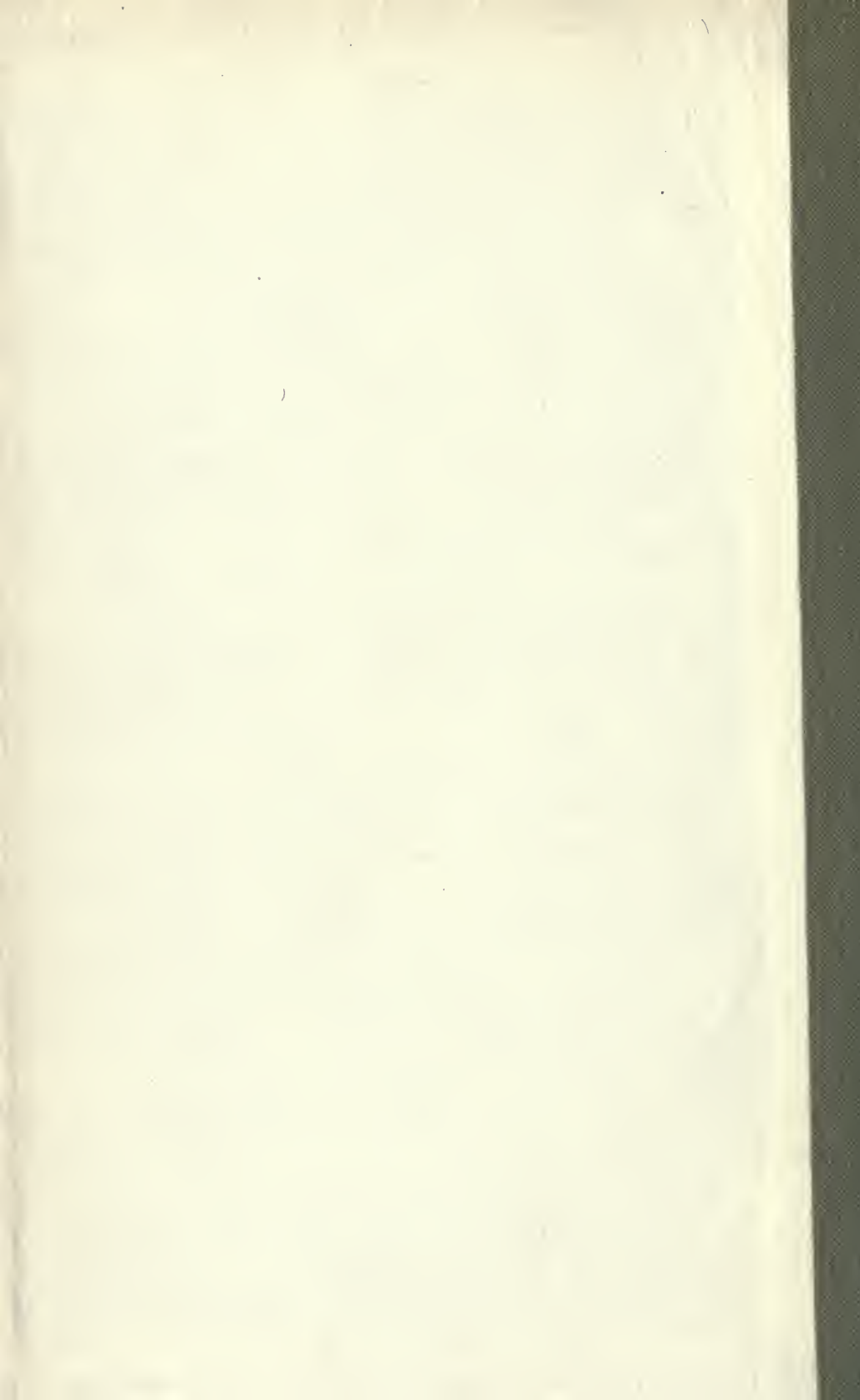


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A MONTHLY JOURNAL DEVOTED TO THE
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FOUNDED IN 1884 BY WM. PERRY WATSON, M.D.

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INDEX TO VOLUME XXVII

Abscess of the Liver.....	451
Pulmonary, following Septic Deglutition Pneumonia.....	288
Acetonuria in Infectious Diseases.....	552
In Scarlet Fever.....	66
Achondroplasia	312
Acidified Milk in Pediatric Practice.....	426
Acidosis	80
Adenoids, Value of Early Diagnosis in.....	547
Actinomycosis of the Lungs.....	395
Adrenalin as an Antidote.....	452
Ager, Louis C., M.D.....	284
Albumin in the Urine of Nurslings.....	473
Albuminuria, Orthostatic.....	554
Alexander, Jerome, M. Sc.....	18
Alimentary Decomposition, Metabolism of.....	479
American Pediatric Society.....	317
Anaphylaxis, Clinical.....	312
Antibodies in Tuberculosis.....	150
Antigonococcus Serum.....	557
Anus, Spasm of.....	310
Apparatus for Collecting Urine and Feces.....	129
Appendicitis, and Intestinal Worms.....	131
In Children.....	713
Arthritis Due to Injections of Antidiphtheritic Serum.....	601
Ashby, Hugh T., B.A., M.B.....	363
Atrophy, Infantile.....	119
Avery, C. T., M.D.....	284
Bacillus Coli Infections.....	64
Bactericidal Property of Milk.....	178
Bile Ducts, Congenital Obliteration of.....	433
Bilious Attacks in Children.....	717
Bingham, Arthur W., M.D.....	917
Births, Registration of, Need of More Complete.....	881
Bladder, Exstrophy of.....	879
Bleyer, A. S., M.D.....	198
Blood, Studies in the Concentration of.....	66
Blood Serum of Infants, Proteolytic Substances in.....	65
Book Reviews	79, 159, 239, 316, 480, 559, 560, 639, 951
Bovaird, David, M.D.....	760
Bovine Tuberculosis, A Centre of.....	237
Brady, Jules M., M.D.....	426
Brain Abscess, Report of 2 Cases.....	633
Britton, James A., M.D.....	81
Bromoform Poisoning.....	798
Brudzinski's Neck Sign.....	561
Bronchiectasis, Congenital	331
Bullowa, Jesse G. M., M.D.....	18
Buphthalmia	505

Camerer, Wilhelm, Obituary.....	783
Carpenter, George, Obituary.....	535
Carr, Walter Lester, M.D.....	1
Casein Curds in Infants' Stools.....	126, 440
Milk	602
Cerebral Centres, Higher, Biological Variations in.....	506
Child Life, Factors in the Conservation of.....	721
Chlamydozoa in Blenorrhoea Neonatorum.....	60
Chantmesse Reaction for Typhoid Fever.....	208
Chondrodystrophy, Congenital	153
Chorea	848
History Fifteen Years After.....	393
Latent	238
Churchill, Frank S., M.D.....	81
Circulatory Failure in the Acute Infections of Childhood.....	332
Cleft Palate Operations.....	70
Clemens, J. R., M.D.....	353
Coit, Henry L., M.D.....	721
Cold Air, Value and Limitations of, in Diseases of the Respiratory Tract	896
Colds, Etiology of.....	712
Colles Laws.....	393
Colloids in Milk.....	18
Colon Infections of the Urinary Tract in Children.....	826
Color Sense, Investigation of.....	67
Colostrum, Unusual Persistence of.....	32
Complements, Diphtheritic, in Human Milk.....	158
Conjunctivitis, following Measles.....	145
Contralateral Reflex.....	561
Cook County Juvenile Court, Medical Work of.....	81
Crippled Child, Education of.....	345
Croup, Morphin in the Treatment of.....	880
Danver's Dysentery Epidemic, Conclusions from.....	72
Deaf Child and the Physician.....	311
Defectives, The Education of.....	530
Delicate Children, Treatment of by the Class Method.....	609
Development in Children.....	397
Diabetes, Infantile.....	794
Diarrheal Diseases, Recent Studies on.....	72
Diarrhea, Treatment of.....	77
Summer, Recent Teaching Concerning.....	949
Diphtheria Antitoxin in Human Serum.....	791
Cutaneous	949
Nasal	887
Of the Intestines.....	621
Investigation of 80 Cases of.....	432
Dunn, Charles Hunter, M.D.....	685
Duodenal Atresia, Cause of.....	135
Duodenum, Case of Congenital Stenosis of.....	37
Dysentery, Bacillary, Bacteriology of.....	792
Edema, Neonatorum.....	391
And 'Anasarca in the Newly-Born.....	154
Edsall, David L., M.D.....	321

Eiweissmilch	636
Emerson, William R. P., M.D.....	609
Empyema, Acute Thoracic.....	878
Report of a Long-Standing Case.....	26
Enuresis, Treatment by Re-Education.....	600
Epistaxis, Treatment of.....	415
Esophageal Stenosis of Diphtheritic Origin.....	425
Esophagus, Case of Congenital Malformation of.....	68
Eustachian Obstruction.....	467
Exanthemata, Aural Complications of.....	60
Face, Distortion of, Due to Posture.....	791
Fat Absorption in Infancy.....	800
Metabolism of, in the Normal and the Sick Infant.....	799
Percentages, Regulation of, in Infant Feeding.....	198
Fatty Acid Formation, Action of, in Intestines.....	398
Faucial Tonsils and the Teeth.....	128
Feces, Examination of, after Gastroenterostomy.....	64
Feeding of an Infant.....	315
Fleischner, E. C., M.D.....	586, 826
Flexner, Simon, M.D.....	93, 481
Forchheimer, F., M.D.....	491
Friedenwald, Edgar S., M.D.....	801
Freeman, Rowland G., M.D.....	37, 203
Gas Bacillus, Rapid Test for Diarrhea Caused by.....	877
Gastric Digestion in Infants.....	470
Gastroenterostomy, Physiological Aspects of.....	69
Gerstenberger, H. J., M.D.....	129
Girls, Adolescent, Criminal Tendencies in.....	797
Gittings, J. C., M.D.....	209
Goiter, Congenital	930
Goler, George W., M.D.....	445
Gonorrhea, Rectal, in Childhood.....	759
Graham, Edwin E., M.D.....	887
Gray, Thomas N., M.D.....	903
Growing Pains.....	395
Gruening, Emil, M.D.....	732
Hand, Alfred, Jr., M.D.....	26
Heart Sound, First, in Children.....	491
Height, Weight and Epiphyseal Development in Boys and Girls...	567
Heiman, Henry, M.D.....	570
Hematuria and Pyuria in Infants and Children.....	237
Hemoglobinuria, Paroxysmal.....	795
Hemophilia	471
Hemorrhage of the Adrenals in Infants.....	541
Cerebral, in the New-Born.....	361
Hemorrhagic Conditions, A Review of Recent Work in.....	76
Disease in the Newly-Born, Case of.....	239
Hemorrhoids in Children.....	360
Hereditary Lues, Prognosis and Symptomatology of.....	880
Hernia in Children, The Subcutaneous Treatment of.....	151
Herrman, Charles, M.D.....	600, 680
Hip, Congenital Dislocation of.....	390

Hirsch, I. S., M.D.....	179
Holt, L. Emmett, M.D.....	641
Home as a Factor in the Medical Inspection of School Children....	557
Hoobler, B. R., M.D.....	672
Hour of Birth.....	469
Howland, John, M.D.....	332, 678
Huber, Francis, M.D.....	179
Human Blood Serum, Use in Hemophilia.....	609
Hypothyroidism in Childhood.....	879
Illoway, H., M.D.....	921
Incontinence of Urine, Treatment of.....	700
Infant Feeding, Present-Day View of.....	903
Serological Studies in the Theory of.....	78
Infantile Mortality, Rôle of the Visiting Nurse in the Reduction of.	680
Paralysis, Transmission of, to a Chimpanzee.....	151
Pharynx, Study of.....	467
Infant Stools, Casein Masses in.....	126
Infectious Diseases.....	71
Influenza Meningitis, Case of.....	284
Intestinal Indigestion, Treatment of, on the Basis of Examination of the Stools, and Caloric Values.....	799
Strangulation, Passage of Bacteria through the Intestinal Wall in.....	63
Intranasal Measurements.....	547
Intubation Tube, Retained.....	531
Intussusception, Diagnosis and Treatment of.....	236
Inunction Method of Administering Drugs to Children.....	17
Jacobi, Abraham, M.D.....	783
Jones, Eleanor C., M.D.....	119
Judd, James R., M.D.....	451
Kendall, Arthur I., M.D.....	613
Knox, J. H. Mason, M.D.....	881
Koplik, Henry, M.D.....	653
Lactalbumin in Infant Feeding.....	400
Lactic Acid Bacilli.....	613
Ladd, Maynard, M.D.....	416
Lange, Prof. F.....	837
Larynx, Papillomata of.....	947
Laryngoscopy, Extension and Flexion in.....	548
Lateral Sinus, Thrombosis of.....	790
Leopold, Jerome S., M.D.....	40, 126, 602
Leukocyte Extract in Sinus Thrombosis.....	876
Lewis, Paul A., M.D.....	93
Linen, Sterilized, Use of, in Nurslings.....	292
Liver, Enlargement of, Family Type.....	68
Long Bones, Fracture of, in Children.....	612
Lumbar Puncture in Whooping-Cough.....	701
Lymphadenitis in German Measles.....	153
Lymphocythemia in Children.....	720

McCready, E. Bosworth, M.D.....	506
Malnutrition in the School Child.....	8
Mastoid Operation, Temperature Changes as an Indication for.....	735
Mastoid Region, Abscess of.....	946
Meara, Frank S., M.D.....	261, 401, 514, 579
Measles, Early Diagnosis of.....	73, 679
Mechanical Injuries of the Head.....	921
Meconium, Simulating Intestine.....	203
Mediastinal Glands, Importance of Recognizing.....	437
Medical Society Meetings.....	207
Melena Neonatorum.....	604
Meningism	9
Meningitis, and Conditions Simulating Meningitis.....	261
Cerebrospinal, Results in.....	144
Complicating Pneumonia	355
Influenzal	952
In Infancy and Childhood.....	561
Tuberculous, An Intermittent Form of.....	552
Tuberculous, Cytodiagnosis of.....	685
Tuberculous, Remissions and Recovery in.....	72
Meningococcus Carriers.....	399
Merrick, R. M., M.D.....	593
Metabolism Experiment after Gastroenterostomy.....	469
Meyer, Ludwig F., M.D.....	126
Middle Ear, Rhinestone Removed from.....	790
Milk, Casein Content of Woman's.....	466
Clean	445
Morning, Use of, for Infants.....	31
Physiological Variations in the Composition of.....	478
Mineral Salts, Importance of, in Nutrition of Infants.....	475
Monti, Alois. Obituary.....	783
Mooney, Edward W., M.D.....	930
Morse, John Lovett, M.D.....	561
Moser's Serum in Scarlet Fever.....	477
Mother, Education of, in Relation to Infantile Mortality.....	605
Mouth and Infectious Diseases.....	157
Muscular Dystrophy, Congenital, Case of.....	34
Myotonia, Congenital	363
Myxosarcoma in a Child of Three Years.....	63
Nasal Obstruction.....	61
Nephritis	917
Nephritis without Albumin.....	635
Nervous Children, Care and Management of.....	499
New-Born, Physiological Loss of Weight in.....	398
New England Pediatric Society, Report of Meetings.....	218, 378, 624
New Jersey State Pediatric Society.....	235, 631
New York Academy of Medicine, Section on Pediatrics, Report of Meetings	46, 136, 224, 293, 368, 453, 682
Nitrogen Metabolism in Healthy Infants.....	853
Northrup, William P., M.D.....	531
Nose and Accessory Sinuses, Development of.....	389
Nutrition in Early Life, Some Problems in.....	401, 514, 579

Omentum, Large Cyst of.....	69
Orthopedic Surgery, Relation of, to Pediatrics.....	910
Otiatrics and Pediatrics.....	732
Otitis Media, Purulent, of Infancy and Childhood.....	236
Pancreatic Cyst.....	125, 439
Park, William H., M.D.....	448
Peck, Elizabeth L., M.D.....	433
Pediatric Work in Germany and Austria.....	40
Perforation, Intestinal, During Typhoid.....	352
Pericarditis in Children.....	760
Peritonitis in Infancy.....	70
Tuberculous	718
Philadelphia Pediatric Society.....	55, 140, 233, 305, 383, 457, 543, 628, 870, 939
Pineal Gland, Diagnosis of Tumors of.....	471
Pinworms, Treatment of.....	490
Plantar Reflex in Infancy and Childhood.....	586
Pleural Effusions, Auto-serotherapy in the Cure of.....	558
Pneumococcic Infections.....	1
Pneumococcus Empyema.....	152
Pneumonia in Children.....	473
Lobar, Differential Diagnosis of.....	552
The Use of Vaccines in the Treatment of.....	558
Pneumothorax	179, 241, 794
Polio-myelitis, Clinical Features of.....	641
Early Stages, Treatment of.....	399, 444
Epidemic of, in Westphalia.....	71
Epidemic of, in Wisconsin.....	717
Etiology of.....	470, 592
Experimental Epidemic.....	93, 481
Experimental Investigations in.....	782
Management of.....	750
Nature and Mode of Infection.....	623
Prophylaxis in.....	825
Review of Recent Work on.....	134
Symptomatology of.....	154
Porter, Langley, M.D.....	9, 826
Premature Infants, Management of.....	149
Results of Substitute Feeding in.....	416
Pritchard, William B., M.D.....	499
Prolapse of the Rectum, Treatment of.....	640
Pseudodiphtheritic Bacilli.....	469
Psychasthenia in a Child Aged Two Years.....	778
Purpura, Case of Infectious.....	214
Pyelocystitis in Infancy.....	801
Pylorospasm	76, 399
Pylorus, Congenital Stenosis of.....	878
Pyramidal Tracts, Clinical Significance of Lack of Development of.....	849
Rachford, B. K., M.D.....	849
Rectal Anesthesia, Death following.....	395
Renal Hemorrhage in Children.....	65
Repplier, Sidney J., M.D.....	204
Rheumatism in Childhood, A New Sign in.....	353

Fever, Etiology of.....	549
Rickets, Experimental, Condition of the Blood in.....	206
Treatment of.....	635
Ross, George W., M.D.....	132
Rotch, Thomas Morgan, M.D.....	567
Salts, Influence of, on Metabolism.....	475
Scarlet Fever.....	73
Meninges in.....	232
Prophylaxis with Streptococcus Vaccine.....	201
Schlivel, Kaufman, M.D.....	34, 291
Schloss, Oscar M., M.D.....	100
Scripture, E. W., M.D.....	438
Sea Water, Therapeutic Use of, in Infants.....	593
Seilkovitch, S., M.D.....	288
Sepsis, Local, as a Factor in Rheumatism and Gout.....	312
Septicemia as a Complication in Skin Diseases.....	148
Serotherapy, Intensive.....	364
Sheffield, Herman B., M.D.....	622
Sinus Thrombosis.....	468
Smith, Richard M., M.D.....	201
Southworth, Thomas S., M.D.....	167
Spasmophilia and Calcium.....	797
Spinal Paralysis, Early Stage of.....	391
Orthopedic Treatment of.....	837
Spirocheta Pallida in Umbilical Cord of New-Born.....	549
Spleen, Enlargement of, Family Type.....	68
Status Lymphaticus and Anesthetics.....	792
Steele, H. Merriman, M.D.....	32
Steffen, Johannes Theodor August, Obituary.....	783
Stenosis of the Larynx following Diphtheria.....	632
Sterling, E. Blanche, M.D.....	605
Stools of the New-Born.....	167
Streptococcal Infection in Diphtheria.....	75
Stricture of the Esophagus.....	132
Stuttering, Pathology and Therapy.....	158, 438
Suppurations, Local Treatment of.....	152
Syphilis, Cerebrospinal, Case of.....	291
Hematology of Hereditary.....	155
Hereditary, Cerebrospinal Fluid in.....	396
Hereditary, Crying a Sign of.....	474
The Serodiagnosis of, in Relation to Disease of the Ear.....	876
Syphilitic Aortitis.....	118
Talbot, Fritz B., M.D.....	440
Tapeworm, Dwarf.....	100
Taylor, Henry L., M.D.....	750
Tetanism.....	622
Tetanus, Cases of.....	238, 798
Thigh, Fracture of, in the New-Born.....	69
Thyroid Gland, Topographic Anatomy of.....	314
Tonsil, Faucial, Complete Extirpation of.....	62
Indiscriminate Enucleation of.....	546

Tonsils and Adenoids.....	146
Tonsil Operation, Present Status of.....	147
Transfusion in Hemorrhage of the New-Born.....	878
Trichiniasis without Initial Eosinophilia.....	149
Tubercularization of the Young Infant, Ways of.....	566
Tuberculin Test, The Cutaneous.....	161
Tuberculosis, Bovine.....	237, 448
German Methods of Prevention of.....	239
Frequency of, in Childhood.....	553
Infantile	556
In Infants, Whooping Inspiration in.....	627
In School Children.....	796
Joint, Practical Hints on.....	550
Miliary of the Skin.....	74
Problem, The Mother and Child in.....	396
Prophylaxis of.....	75
Of the Shoulder in Children.....	389
Tuberculous Glands.....	713
Infection, Buccal Mucous Membrane in.....	791
Tracheobronchial Lymph Nodes.....	392
Twinch, Sidney A., M.D.....	910
Typhoid Fever in the Fetus.....	
Patients' Sputum a Source of Infection.....	635
Transmission of, by an Infant.....	684
Uremia, a Sequel to Scarlet Fever.....	786
Ureter, Congenital Strictures of.....	948
Urinary Tract, Suppurative Diseases of.....	795
Vaccinal Immunity, Loss of.....	630
Vaccines, Use of, in Children's Diseases.....	672
Vaccinia, Morbilliform Rash in.....	671
Vacuum Bottle for Pasteurization.....	711
Vesical Calculus in a Child of Five.....	633
Vision of the Child, Effect of School Life on.....	534
Vomiting, Periodical, in Children.....	551
Von Pirquet, Clemens, M.D.....	161
Von Ranke, Heinrich, Obituary.....	783
Wallace, Charlton, M.D.....	345
Wasserman Reaction with Milk.....	65
Water Metabolism, Disturbances of.....	947
Werlhoff's Disease, On the Syphilitic Origin of.....	474
Wet-Nurses, A Registry for.....	207
Whey, Importance of, in Feeding.....	718
Williams, Tom A., M.D.....	778
Whiting, Fred, M.D.....	735
Whooping-Cough, Etiology of.....	304
The Infectious Agent in.....	869
Oxygen in.....	777
Precision in the Treatment of.....	77
Treatment of	945
X-Ray Technique in Treatment of Laryngeal Papillomata.....	712

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ORIGINAL COMMUNICATIONS.

PNEUMOCOCCIC INFECTION.*

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Since the pneumococcus was first described (Fränkel and Weichselbaum) its connection with pneumonia has been accepted as the etiologic factor in a majority of cases of this disease, but it is not always remembered that it is found in pleurisy, pericarditis, endocarditis, meningitis, otitis, diseases of the accessory sinuses of the nose, arthritis, osteomyelitis, diseases of the liver, spleen, kidneys, lymph nodes, skin, and mucous membrane. It may be present in bronchitis without pneumonia, or in otitis without any subsequent inflammation of the lung. Infections of the ethmoid and sphenoid structures may be observed in patients who

* Read at the Twenty-first Annual Meeting of the American Pediatric Society, Lenox, Mass., May 28, 1909.



have no evidence of lung disease, and peritonitis may occur independent of pneumonia.

Park and Williams showed (*Journal of Experimental Medicine*, Vol. II., 1905) that typical pneumococci were present during the winter months in the throat secretions of a large percentage of healthy individuals in city and country. Under these conditions they are not, however, always pathogenic for animals; in many instances they are virulent in only from 15 to 20 per cent. of such cases. The virulence of the organism is variable; in the sputum of a case of lobar pneumonia early in the disease it is likely to be very virulent. The pneumococcus can be recovered from the blood in practically all cases of croupous pneumonia and other infections.

Desguin, in an article (*La Septicémie Pneumococcique*, Bruxelles, 1908) states that the pneumococcus is becoming daily more important in both medicine and surgery. This is chiefly shown in the fact that much so-called grip and grippal disease in general is caused by the pneumococcus. The pneumococcus is closely related to the streptococcus, having all the qualities of polymorphism and ability to cause diseases of widely dissimilar types.

The entrance of this organism into the deeper tissues when a surface lesion occurs can be readily understood. Its action will, of course, be favored by any condition of depressed vitality.

Netter gives (Muir and Ritchie, *Pathology*, 1907) the following tables of the relative frequency of the primary infections by the pneumococcus in man:—

(1) In adults: Pneumonia, 65.95 per cent.; bronchopneumonia, capillary bronchitis, 15.85 per cent.; meningitis, 13 per cent.; empyema, 8.53 per cent.; otitis, 2.44 per cent.; endocarditis, 1.22 per cent.; liver abscess, 1.22 per cent.

(2) In children, 46 cases were investigated. In 29 the primary affection was otitis media; in 12, bronchopneumonia; in 2, meningitis; in 1, pneumonia; in 1, pleurisy; in 1, pericarditis.

Pneumonia.—The diplococcus pneumoniae is found, according to Weichselbaum, in 70 per cent. of cases of croupous pneumonia, but Park states that it is present in 95 per cent. Charazain-Witzel found the coccus restricted to the lung in 66 per cent. of cases of pneumococcus infection. Others have found a much higher percentage of blood infection. Eichhorst found the pneumococcus in the blood in all the cases he studied.

Pleurisy.—The pneumococcus is the common factor in fibrous pleurisy (Lord, in *Osler's Modern Medicine*). It is only rarely a cause of clear serous effusions, but is more common in the primary empyemas of children, and in all effusions complicating lobar pneumonia.

Empyema.—The pneumococcus appears to be the most frequent organism occurring in empyema as a pure infection. Of 109 empyemas investigated by Netter, it was present in 53.6 per cent. of 28 cases in children; while in 89 cases in adults it was found in 54 of 137 cases, or 39.4 per cent.

In pleurisies the pneumococcus shows a marked tendency to die out; it may be found in smears, but cultures are frequently sterile, which shows why these cases run a favorable course.

When the pneumococcus invades the pleura it produces the same constitutional symptoms as if the lungs were involved. In tuberculous empyema associated pneumococci may cause supuration.

Ear.—Muir and Ritchie (*Manual of Bacteriology*, 1907) state that the primary cause of infection in a great many cases is an otitis media, such infection being from the nasal cavities.

Yearsley (*Text Book of Diseases of the Ear*) states that Hasslauer (*Klinische Beiträge*, Vol. V., No. 3) examined 82 cases microscopically by cultures and by animal experiments. Of 63 primary cases of otitis, 42 were examined after paracentesis, and 19 after spontaneous perforation. In both groups the diplococcus of pneumonia was found most frequently, the staphylococcus coming next.

Meningitis.—Elter (*Journal of Medical Research*, Vol. XIV.) found the pneumococcus in 2 of 102 cases of meningitis.

L. Kirchheim (*Med. Klinik.*, 1908, Vol. IV., p. 1,460) (*Meningismus und Meningo-Encephalites bei Kroupöser Pneumoniae*) had, among 500 cases of pneumonia, 6 with meningeal symptoms and clear cerebrospinal fluid, the symptoms appearing very early in the disease. He calls the symptoms meningism. Three other cases he calls meningoencephalitis. The symptoms, which may appear early, late or only after the crisis, are not only meningeal, but indicate focal cerebral lesions as well and may last for some time—ten and one-half weeks in one case. At autopsy, hyperemia and edema of brain and meninges, with accumulation of clear fluid, were found. Microscopically, there was round-cell

infiltration around the vessels and even at some distance from them in the gray matter of the brain and cord. This pneumococcic meningitis was always fatal. The number of cases recorded is not given.

In many instances where no other lesions are present the extension is by the Eustachian tube to the middle ear. In other cases the path of infection is from some other lesion by means of the blood stream. A considerable number of cases, especially in children, are due to the pneumococcus alone, but the pneumococcus may be associated with tubercle bacilli here as elsewhere. Desguin reports a case of pneumococcic abscess of the brain in a child aged four years. The germ was doubtless conveyed through a penetrating fracture of the skull. The lesions remained localized. In another child of thirteen there was traumatic pneumococcic meningitis. There had been a fracture of the base of the skull, setting up otitis and meningitis. The lesions were all intracranial.

In a recent case under my observation a baby, aged one year, was admitted to the New York Eye and Ear Infirmary, on the service of Dr. Marple, shortly after recovering from pneumonia, with an acute conjunctivitis. Pneumococci and staphylococci were found by Dr. Waters, the house surgeon, in smears from the eyes. The child had scorbutic symptoms, but there were changes in the ankle joints independent of the scurvy, and these were regarded as due to the primary infection. All tuberculin tests were negative. Two months later the child developed meningitis. Lumbar puncture showed pneumococci. Death from meningitis ensued nine days after initial chill.

The fluid drawn by lumbar puncture may be, as stated by Kirchheim, clear in cases of meningism (pneumonia with cerebral symptoms), or it may be turbid or purulent in meningitis from the pneumococcus. This purulent character is mentioned by a number of authors, Allard being the latest authority. ("*Lumbar Punction*," *Ergebnisse der Innere Med.*, 1909, p. 125.)

Pericarditis.—Direct extension of inflammation is probably very rare. In pleuropneumonia, in which it is said to occur, the invasion of the pericardium is not an extension of the inflammation from the pleura, but an infection of the pericardium by pneumococci brought from the lung—generally by the blood, but sometimes by the lymphatic circulation. Some believe that the

pericardium is more often infected at the same time and from the same source as the lung, and not secondarily to it.

Preble believes (*American Medicine*, June 15, 1901) the liability to pericarditis in unilateral pneumonia to be in the ratio of 1 to 40 cases; in bilobar and trilobar, 1 in 10; and in quadriobar, 1 in 5. It is more common in affections of the right lung than of the left.

Holt states that pericarditis is rare, and in his series of pneumonia cases he saw only 2 with pericarditis associated with inflammation of the left lung.

Endocarditis.—In an editorial note in the American edition of *Nothnagel's Practice*, it is recorded that Wells found endocarditis in 3 per cent. of all cases, or 4 per cent. of all fatal cases of pneumonia. But in 517 postmortem reports it was noted in 20 per cent. Pneumococcic endocarditis may occur, of course, without present or past pneumonia. Muir and Ritchie (q. v.) state that in some cases of ulcerative endocarditis following pneumonia the pneumococcus is present.

Rosenow, in a recent contribution (*The Journal of Infectious Diseases*, April, 1909, Vol. VI., No. 2), has made a careful study of a number of cases of endocarditis. Some of these were protracted, and particular interest attaches to them because of the blood cultures that were made as to the cause of inflammation. The pneumococcus was present either as a primary cause of endocardial disease or as a secondary infection of old processes of supposedly rheumatic origin. Endocarditis was developed in 5 of 10 animals inoculated before the special characteristics of the pneumococci were lost. Pericarditis developed in 6 cases. In 2 endocardial lesions were absent, while pericarditis developed and also beginning thrombosis of the portal vein. In a clinical group it was observed that 2 cases followed tonsillitis.

The exact duration of the disease could not be accurately determined, but probably ranged from four to twelve months or more. The blood cultures were the means of making the diagnosis in almost all cases. In some cases it was difficult to make a correct diagnosis because of the insidious onset and chronicity, and most of all because the acute process was ingrafted upon an old valvular lesion.

Wadsworth (*Medical Record*, December 28, 1907) states that experimental studies have demonstrated the importance of previous injury of the endocardium in determining the secondary

localization of the infection in the heart. He makes mention of the fact that while the infection of the lung by the pneumococcus is almost always benign, it is in the heart practically fatal.

Peritonitis.—The diplococcus pneumoniae was several times found to be the only microorganism, especially in the acute peritonitis of infants. (*Nothnagel's Practice. Diseases of the Intestine and Peritoneum.* Philadelphia, 1904.)

From its higher incidence in girls, and from the fact that the inflammation is frequently limited to the lower part of the abdomen, so that it often simulates appendicitis, Brun thought that the pneumococcus might find an entrance through the Fallopian tubes.

In 33 cases collected by Quéhart and given by Nothnagel, 27 were in girls and 6 in boys; it is rare in men, but is less frequent in men than in women.

According to Dieulafoy, the onset of this form is sudden, without prodromal symptoms; there are sudden pain, vomiting, and subsequent abdominal symptoms.

Clarke (*Bristol Medico-Chirurgical Journal*, 1907, Vol. XXV.) observed 2 cases of peritonitis of unusual interest:—

In the first case, a girl of nine years, the abdominal symptoms were first noted and there was a spontaneous opening. The pus showed the pneumococcus in pure culture. In this case the dullness was over the front of the abdomen. The appearance of the child indicated tuberculosis. Pneumonia occurred one month after the abdominal symptoms.

The second case was in a girl of four, sister of the above, and an incision gave pus that showed the pneumococcus in pure culture.

Marfan states that before puberty the tender area of pneumonia is felt over the abdomen. The fact that tenderness sometimes exists in such cases before the diagnosis of a pulmonary lesion is apparent is used by this author to explain that the coccus has primarily attacked some nearby organ (appendix, spleen, stomach, etc.) before invading the lung. The conditions are sometimes reversed, as when a peritonitis leads at first to the diagnosis of a pneumonia.

Many cases of pneumococcic disease are located in the digestive tract. It is probable that many visceral infections occur by direct absorption through the digestive tube. Marfan reports a case in a child, aged four, with the following localization

of pneumococcic infection: Appendicitis, ulcerous enteritis with multiple perforations, and general peritonitis. The child recovered, treatment consisting largely of serotherapy.

Another child, aged nine, had appendicitis of the influenza type, encysted peritonitis and intestinal perforations. Recovery occurred under serotherapy.

Arthritis.—Herrick, in an article on "Pneumococcic Arthritis" (*American Journal of the Medical Sciences*, 1902), reviews the subject and refers frequently to Leraux (Paris, 1899) and Cave (London, 1901). Many authors do not mention this form of arthritis, and it probably occurs once in 800 cases of pneumonia. Of 47 cases, 40 were males and 7 females. Before ten years there were 4 cases, but between ten and twenty years there were no cases. The other cases reported by Herrick occurred after twenty years of age. Two cases, 1 a child, were also observed, in which no cultures were made. Recovery followed.

The knee is the joint most often affected. Holt had 1 case in which the shoulder joint was affected. Pfisterer (*Jahrb. für Kinderhk.*, April, 1902) gives a mortality of 65 per cent. in the joint cases.

Complications.—Clarke (*Bristol Medico-Chirurgical Journal*, 1907, Vol. XXV.). Cases illustrating the more unusual complication of pneumonia. In 126 cases there were: Peritonitis, 2 cases; thrombosis of vessels, 3 cases; endocarditis, 2 cases; nephritis, 1 case; arthritis, 1 case, besides empyema, etc.

Thrombosis.—Of 32 cases collected by Steiner (*Johns Hopkins Bulletin*, 1902), 27 occurred during convalescence, and, according to Osler, thrombus nearly always occurs in the femoral veins. It is more uncommon in the arteries than in the veins.

Thrombosis of the cerebral vessels occurs either early in the disease or during early convalescence. A general thrombosis may result from the systemic infection. One fatal case is recorded by Clarke.

Pic and Bonnamour (*Archiv. Gén. de Méd.*, 1908, p. 593. *Formes Cliniques de la Septicémie Pneumococcique*) from a scientific point of view would divide all pneumococcic infections as follows:—

I. Localized.

- (a) In the form of pulmonary congestion.
- (b) In the form of pneumonia.

II. Generalized.

- (a) Following pneumonia.
- (b) Following pulmonary congestion.
- (c) Terminating in pneumonia.
- (d) After penetration of the pneumococcus through the skin.

Clinically, there are four classes:—

1. General and local phenomena equally attenuated.
 - (a) Different forms of congestion of Woillez.
 - (b) Splenic phenomena of Grancher.
 - (c) Pleural effusion of Dieulafoy.
2. General and local phenomena intense; lobar pneumonia acute.
3. Local phenomena manifest, but the general ones are aggravated and mask the local ones.
 - (a) Extrapulmonary localization of the pneumococcus.
 - (b) General infection.
4. Local phenomena absent; general ones predominate or are present alone.

Free primary septicemia without initial phenomena. All reported cases (4) have thus far terminated fatally.

The infection by the pneumococcus should be recognized in the different organs and tissues, and blood cultures should be made in all doubtful cases.

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A STUDY OF MALNUTRITION IN THE SCHOOL CHILD.—E. M. Sill (*Journal of American Medical Association*, June 19, 1909), in making a study of 210 cases of malnutrition in school children, found that 175 drank either tea or coffee at least once a day, and about 25 per cent. had it three times a day. The houses in which they lived allowed on an average 600 cubic feet of air *per capita*. These children all stayed up one to four hours longer than they should at night. Baths were given rarely; 86 per cent. had dental caries; 90 per cent. had adenoids. He urges instruction of mothers in what foods are most nutritious as a remedy.—*Boston Medical and Surgical Journal*.

MENINGISM: A CONSIDERATION OF THE SYNDROME OF DUPRÉ.*

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Dupré, at Lyons in 1894, speaking before the Medical Congress, then in session, coined the word meningism to describe a clinical picture very like true meningitis, but which is unaccompanied by demonstrable pathologic lesion of the meninges and which tends to rapid and complete recovery when the patient is relieved of the toxemia, which almost invariably is the cause of the condition.

My attention was first fixed on this condition some years ago during an epidemic of cerebrospinal meningitis, when the case first quoted was sent into the wards of the County Hospital. Since then, in searching the literature for similar cases, and for illuminating papers, I was able to find but two references in English to the condition. A paper by Jackson, of Chicago (*Journal of American Medical Association*, 1907), and a paper by Tylecote, of Manchester, with an extensive bibliography, in the *Medical Chronicle* of 1907, page 157. The German literature was also scanty, and, with the exception of a long paper by Krahn-halls on cases of meningeal irritation occurring together with influenzal infection, and another by Doernberger detailing a case of pneumonic meningism with aphasia, *Münch. Med. Woch.*, 1904, H. 19, and a third by Staubli, *Deutsch. Archiv. für Klin. Med.*, B. 82, H. 1., dealing with meningitic irritation accompanying typhoid fever; and a full treatment in Pfaundler and Schlossman's text book, there was very little to be found. More attention has been paid by French writers to this group, beginning with Bouchut, in 1866 (*Traite des Maladies d'Enfant*), who described it under the name of pseudomeningitis and divided it into four groups:—

- (1) Chlorotic pseudomeningitis.
- (2) Pseudomeningitis, due to worms and intestinal irritation.
- (3) Gastric pseudomeningitis.
- (4) Pseudomeningitis accompanying tonsillitis and acute diseases.

The French writers are divided into opposing schools by their views on the matter. One school, represented by Gilles de la Tourette, considers that this group of symptoms can occur, and

* Read before the California State Medical Society.

does occur, only in hysterical subjects or those with very definite neuropathic history or heredity. The other faction holds, it would seem with more reason, that the condition is inevitably secondary to an intoxication. Pochon, in his thesis (Paris, 1897) entitled "Meningism and Meningitis," takes the middle ground and divides the cases into those due to infection and those in which the hysterical element is predominant, and apparently with reluctance he admits the group of toxic cases into the classification of meningism.

To us of this community the group of cases entirely or in part due to neuropathic taint as such, is of very little moment, for we see no such an amount of hysteria as do the French, but I have no doubt that every medical man of experience has more than once had to treat a case of acute infective disease in which the signs of central nervous disturbance, very like the signs that appear in meningitis, were present. I have quoted you six instances that within a few years past have come into my own field of observation, and in talking with colleagues I have learned of several more. Whether or not the condition warrants a definite name, it is certainly of the utmost importance for us, as practicing physicians, to recognize that, during the course of infectious diseases or intoxication due to parasites, to drugs, or to products of defective metabolism, there may arise a clinical picture to be distinguished with difficulty from true meningitis. According to one author, 11 per cent. of all the cases of typhoid fever that occur in children show this syndrome. Influenza, diphtheria, pneumonia (lobar or bronchial), all of the exanthemata, malaria, acute intestinal disturbances, the presence of lumbricoid worms in the intestines, uremia, poisoning by a number of drugs, particularly those which act energetically on the kidney, such as cantharides, phosphorus, santonin and alcohol, and conditions due to overfeeding in rickety children, will all be found, if the literature be searched, to have been accompanied by the symptom group under discussion.

The clinical picture, then, is somewhat as follows: A patient, frequently a child, is encountered in the course of an acute disease, most often early in the disease; sometimes the child is irritable and restless, at other times semisomnolent, or even comatose. It probably has had a slight convulsion, although this is not a constant accompaniment. It gives voice from time to time

to a characteristic cephalic cry. Almost invariably it lies on the side with the knees drawn up, the abdomen retracted, the head in marked retraction; opisthotonos may supervene, as in case 4 of my series. The pupils may be irregular in size, one or the other may be fixed; there may be ocular palsies, which vary from time to time in intensity as well as in the muscle affected. In all of the cases I have seen there has been a marked Kernig's sign. Tylecote's experience, however, led him to state that Kernig's sign was practically never present in meningism. There will be a changing Babinski-Oppenheim phenomenon and some alteration in the knee-jerks, usually a markedly exaggerated jerk on one side. Both these reflexes may be variable and we may get a right sided exaggeration with hyperextension on one day and on the next the phenomena may appear on the opposite side. The respiration may be irregular, but it is usually not so; the pulse is often hurried in proportion to the temperature, which is almost invariably high in the condition, as it accompanies the acute intoxications. Now, this picture is one at first glance not to be differentiated with ease from a true meningitis, and a practitioner confronted with such a case during an epidemic would certainly be derelict if he did not consider the latter disease as possibly present.

Blood counts and lumbar puncture may give great help in making a differential diagnosis. From the latter, evidence will be obtained in cases of epidemic meningitis, which should be conclusive. Unfortunately, it has been shown by Hutinel and others that the characteristic cytologic picture found after lumbar puncture of tuberculous meninges may be found at times in other conditions that give rise to meningeal irritation, and which may be confused with tuberculous meningitis. The blood, too, may be misleading, for I have seen a blood count of 80 per cent. polymorphonuclears with a leukocytosis of 24,000 in a child suffering from generalized tuberculosis with meningitis. The chief aid to be had from lumbar puncture in differentiating between meningeal irritation and a true meningitis will arise from the facts that the fluid is clear in meningism and does not present more than a trace of albumen, does not develop the spider web coagulum on standing, and has the normal reducing power with Fehling's solution; that it flows without evidence of increased pressure in normal quantity; that when planted on media there

is no indication of growth, nor can any organisms be found on examination of films properly prepared, nor is there any development of organisms when the fluid is injected into test animals.

The presence of an increased number of polymorphonuclear leukocytes indicates an acute meningitis, and lymphocytosis is in favor of tuberculosis, although, as said before, its presence is not an infallible sign. If the cells are scanty with a normal fluid drawn under a normal pressure, then the probability is that we are dealing with meningism. As a matter of fact, it is rarely necessary or advisable to make a lumbar puncture in these cases, for when one has seen a few the differentiation is usually easily made. Tylecote gives the following points in differential diagnosis between meningism and meningitis:—

First. In the acute infections meningism is often early in its occurrence and of short duration. This point does not hold in the more chronic condition such as tuberculosis, as illustrated in case No. 4 of my series. He states that Kernig's sign, as a rule, absent in meningism, may be absent in tuberculous meningitis, and is found in about 20 per cent. of healthy people. This statement is not in accord with my experience, as in all of my cases Kernig's sign was marked. According to this author pyrexia is more often absent in meningism than in meningitis. (This is questionable.) To his mind, "the coincidence of opisthotonos favors meningism." "Lumbar puncture," he thinks, "more often benefits meningism than meningitis." "The frequent recurrence of symptoms of meningeal irritation after temporary relief from lumbar puncture favors an organic lesion." "Marked persistent involvement of individual cranial nerves suggests meningitis." "The occurrence of meningeal irritation in the defervescent or convalescent stage of an acute infective disease is against meningism." "Meningism is acute in onset, whereas meningitis usually comes on gradually." Case 4 of my series was an exception, and such exceptions are not rare. In this connection it is probable that a considerable number of cases reported as instances of cured tuberculous meningitis were in reality cases properly to be classed as examples of meningism.

Rocca, in his Paris Thesis, 1898, lays great stress upon the diagnostic value of herpes labialis as a differential point between meningism and tuberculous meningitis. Unquestionably such a point would be of value, as I have not seen, nor can I find, any instance of herpes labialis occurring in tuberculous meningitis.

This writer also suggests that in general the appearance of herpes is a good prognostic sign. After analyzing individual symptoms at length, Rocca comes to the conclusion that tuberculous meningitis does not present any proper symptom that may not be simulated by meningism, and that the detailed study of each symptom gives very little help in arriving at diagnosis. We must depend for our final decision on the complete examination of the patient, both as to person and as to history. We must especially search the blood and the spinal fluid and look for the signs of such diseases and intoxications as our experience teaches us may be accompanied by this syndrome.

Pneumonia, typhoid fever, rheumatism, malaria, diphtheria and the exanthemata, more particularly measles, the diseases most often accompanied by this clinical picture, fortunately all present such definite signs and symptoms that we will usually be certain of arriving at a diagnosis if we make a careful examination of the patient. In the absence of the signs of any of these diseases, especially if the blood count shows a high eosinophile count, the intestinal tract must be carefully searched for parasites.

Rocca quotes with commendation the aphorism of Simon, who believes that irregularity of respiration, especially of the amplitude of the thoracic movements and the dissociation of the thoracic and diaphragmatic movements, always exist in the beginning of a meningitis, and that their presence is almost certain indication that we are dealing with a meningitis. The same author also teaches that the presence of aphasia is a definite indication of true meningitis. However, Doernberger has reported a case of meningism accompanying bronchopneumonia in a child three and one-half years old, in which aphasia was a marked feature. Most of these cases clear up absolutely and with rapidity, and this is given as one of the diagnostic signs differentiating the condition from tuberculous meningitis. Such a sign is of course of very little value to the man who is anxiously working to arrive at a conclusion.

When one considers a typical case of meningitis from whatever cause, one must be struck by the fact that the signs accompanying it are almost entirely referable not to the meninges themselves, but to the neurons of the cortex or ganglia. Again, twitching of the muscles is a very common occurrence in children subject to high fever, and it is always attributable to nutritional disturbances in the neuron, due either to the temperature or to the toxins that cause the temperature. The only definite signs we

know that may be referred to meningeal inflammation *per se* are interferences in gummatous meningitis, with cranial nerves, especially with the sixth, and the condition known as the pachymeningitis of Charcot, in which the dominant signs are nerve pains and trophic disturbances. Most of the symptoms that reveal a meningitis, in the beginning at least, are referable to irritative interference with the pyramidal tract or with the cranial nerve nuclei. Babinski's phenomenon, ankle-clonus, increased knee-jerk, pupillary changes, strabismus and nuchal rigidity, can only be explained by such an interference; even the later phenomena which supervene after the intracranial pressure becomes increased by an accumulation of fluid, may be explained by changes in nutrition and chemical disturbances in those neurons which give rise to the nerves supplying the hypertonic muscles. The grouping of this class of cases as pseudomeningitis by Bouchut, or as meningism by Dupré, would seem, then, to be unnecessary and to be based on no very clear physiological or pathological grounds. It seems quite probable that the symptoms of meningitis, of meningism and of the mild degrees of muscle disturbance in children with pyrexia, are all alike evidences of toxic irritations of the neurons, the only differences being that in meningitis the toxins are to a large extent produced locally in the cerebrospinal spaces and cause pathological changes in the meninges as well as in the central structures. It is not at all improbable, if one may speculate, that before invading organisms can find lodgment in these spaces, and in the nervous tissues, that there must be certain damage by circulating toxins. Meningism is a frequent occurrence in pneumonia, so also is meningitis with the presence of the pneumococcus. In typhoid fever, the infectious disease most commonly accompanied by meningism, careful observation is bringing to light the fact that the bacillus of Eberth does invade the meninges and at times is the cause of a purulent meningitis. The acute exanthemata with which meningism is a frequent associate, have been shown by Hutinel (*Presse Medicale*, March 24, 1909) to be accompanied by a lymphocytosis of the spinal fluid, and he has pointed out that the meninges and the skin alike rise from the ectoderm, and that while the infective agents of the eruptive fevers are unknown, this anatomical fact makes it probable that the spinal coverings are invaded in much the same manner as is the skin.

A consideration of this matter then leads to a conclusion that Dupré's syndrome occurs in many clinical conditions, and that it is of the utmost importance that the practitioner be acquainted with its features, but that an attempt to classify it as an entity is hardly warranted.

As to treatment, we have found that subcutaneous injection of normal salt solution tends to bring about a rapid amelioration of all those symptoms referable to the central nervous system. This result is what we would expect from what Martin H. Fischer and Gertrude Moore (*American Journal of Physiology*, August 1, 1907, Vol. XIX., No. 3) have shown of the power of subcutaneous injections of salt solution to render the intestine an excretory organ. Fischer's experiments showed that, when sugar was injected alone it is excreted only by the kidney, but when injected with salt solution, both kidney and gut share in excreting. It is reasonable to suppose that this is true of many different kinds of chemical bodies, including the bacterial toxins.

CASE I. A boy, aged seven, was brought to the City and County Hospital suffering with an undiagnosed fever. The child lay with his head retracted, on the side, knees drawn up. The child was very much wasted, the lips were dry and fissured, and the tongue and teeth covered with sordes. The abdomen was not markedly retracted. The pupils were irregular, the right larger than the left with slight internal strabismus. The child was comatose. The abdominal reflexes were not elicited. The knee-jerk was brisk on the right, exaggerated on the left side with a definite Babinski and marked Kernig. The picture was one strongly suggestive of epidemic meningitis which was then prevalent. The diagnosis of typhoid fever, however, was arrived at by the character of the temperature and pulse, and confirmed by the fact that the child had a marked Widal reaction. Symptoms gradually cleared up after a week in the hospital.

CASE II. A second such case was seen shortly afterward in consultation with Dr. E. E. Kelley; a child of eight, whose mother was suffering from typhoid fever, in the first week of an attack of fever which was excessive in height, reaching $106\frac{1}{2}^{\circ}$ F., was taken with vomiting, marked retraction of the head and some ocular signs. The child also showed a typical Kernig's sign, Babinski and ocular changes evidenced by fugitive strabismus, a temperature of 105° F., the most marked Widal reaction I have ever seen; agglutination at a dilution of 1-100,000 in ten minutes. The picture, sim-

ilar to that in the first case, was strongly suggestive of meningitis, but it cleared up promptly.

CASE III. A boy was brought to the Lane Hospital suffering from a disease diagnosed as cerebrospinal meningitis; the characteristic signs were all present. A lumbar puncture revealed a perfectly normal spinal fluid. Blood examination showed 7,200 white cells, of which a predominance were polymorphonuclear. Temperature was 100°F. in A.M.; 103°F. in P.M. Repeated attempts failed to show a Widal reaction; blood cultures were negative. The boy had characteristic Hutchinson's teeth and it was considered wise to try inunctions of mercurial ointment. Whether this helped or not, within about two weeks the signs progressively disappeared and the boy got well.

CASE IV. A boy of three, admitted to the children's ward of the County Hospital, suffering from a bronchopneumonia, was suddenly attacked during the second week of his disease by a complex in which head retraction was the most marked feature. There was also present a retracted abdomen, some fugitive eye signs and a well-marked Babinski phenomenon. In this case Kernig's sign was not marked. Under appropriate treatment this case slowly got well.

CASE V. An infant, fourteen months of age, was seen in the Lane Hospital, and diagnosed as miliary tuberculosis with meningitis. The child showed marked head retraction. It lay on its side with the knees drawn up; the abdomen was not retracted and the child was not very emaciated. Kernig's sign was extreme. The child had a very marked external strabismus on the right side with a dilated irregular pupil on the left. Dr. Ebright, who saw the case with me, performed lumbar puncture with the manometer needle designed by himself, and we were both surprised to find that there was no excess of pressure in the spinal canal, and that the spinal fluid was normal. The postmortem of this case showed that the child had a straightforward caseous tuberculosis of the lung. That organ was crowded with large tuberculous masses which varied in size from a pea to a large walnut, and lay closely together. The pleura was not invaded and there was no adhesion of the parietal to the visceral pleura. The meninges were perfectly free of infection, no tubercles were visible anywhere on the surface of the brain or cord and so far as one could see, there had been no invasion of these structures. Microscopic examination was omit-

ted. The condition was ascribed to tuberculosis of the lung without generalization and the symptoms of the child were considered to be due to the effect of absorbed toxins on the neurons.

An infant, five months of age, was referred to me by Dr. Hadley Carlson; the baby had been seen in consultation by a number of excellent observers and meningitis was being discussed as a possible diagnosis. Head and spinal retraction was extreme, at times almost approaching opisthotonos. Kernig's sign was not marked in this case. The child was extremely constipated; the stools were of a light gray color, greasy in appearance, in parts gritty and sand-like and in others friable. On investigation it was found that the child had been fed a cream mixture which supplied it with between 5 and 6 per cent. of fat. On regulation of the diet, the condition disappeared and the child recovered completely. In this case the temperature was high, 105° to 106.5° F. Pneumonia was definitely absent.

THE VALUE OF THE INUNCTION METHOD OF ADMINISTERING DRUGS TO CHILDREN.—Rachford (*American Journal of the Medical Sciences*, January, 1909) insists that this mode of treatment is more efficacious in children than in adults because of the following reasons: (1) In infants the surface of the skin in proportion to the body weight is four times greater than in adults, the increased blood and lymph are favoring absorption with re-appearance in the urine, feces, bronchial mucus, etc. (2) In infants the vasomotor mechanism is much more responsive to reflex stimuli than in adults, the capillary circulation being made much more active by the application of heat and friction. (3) All lymphatic structures in the child are more active than in the adult, and functionally more important. Medicines easily pass into the lymphatic circulation. (4) Nutritional problems in the treatment of disease in children are relatively more important, hence the stomach and intestines should be reserved for food if possible. (5) Diseases which are accessible by inunction are more common and more severe in children than in adults. (6) Experiments prove that medicines may be introduced into the circulating media of the body more readily in infants and young children than in adults.—*American Medicine*.

“PROTECTIVE” ACTION OF THE COLLOIDS IN MILK, WITH SOME ULTRAMICROSCOPIC OBSERVATIONS.*

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AND

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Before discussing the importance of protective colloids in milk a few remarks about colloids and the colloidal condition in general may not be out of place.

If we examine the suspension of any fine powder in the ordinary microscope, the individual particles exhibit a slight trembling motion known as the “Brownian movement.” Although this motion is more marked in the case of the smaller particles, it is insufficient to keep them afloat and they gradually sink out of solution.

With the ultramicroscope, which renders visible particles approaching in size molecular dimensions, it has been demonstrated that with increasing fineness of subdivision the motion of the subdivided particles continues to increase in speed and amplitude until it becomes so vigorous and extensive that the particles no longer settle but remain permanently afloat—that is we have a colloidal solution.

If the subdivision proceeds still further we gradually pass into the sphere of true or crystalloidal solution, wherein the particles of the dissolved substance are reduced to molecular dimensions or even split up into ions. The colloidal condition, therefore, is consequent upon an extremely fine state of subdivision and practically any substance can be converted into or produced in this condition.

Some colloids such as gelatin and gum arabic are quite insensitive to electrolytes, and readily redissolve after dessication; others, such as pure colloidal metals, are readily coagulated by electrolytes and do not redissolve upon dessication. Following

* Read before the New York Academy of Medicine, Section on Pediatrics, December 9, 1909.

Hardy, Zsigmondy has expressed this difference by calling the former reversible and the latter irreversible colloids.* The following diagram taken from Professor Zsigmondy's book† will serve to elucidate what has above been stated:—

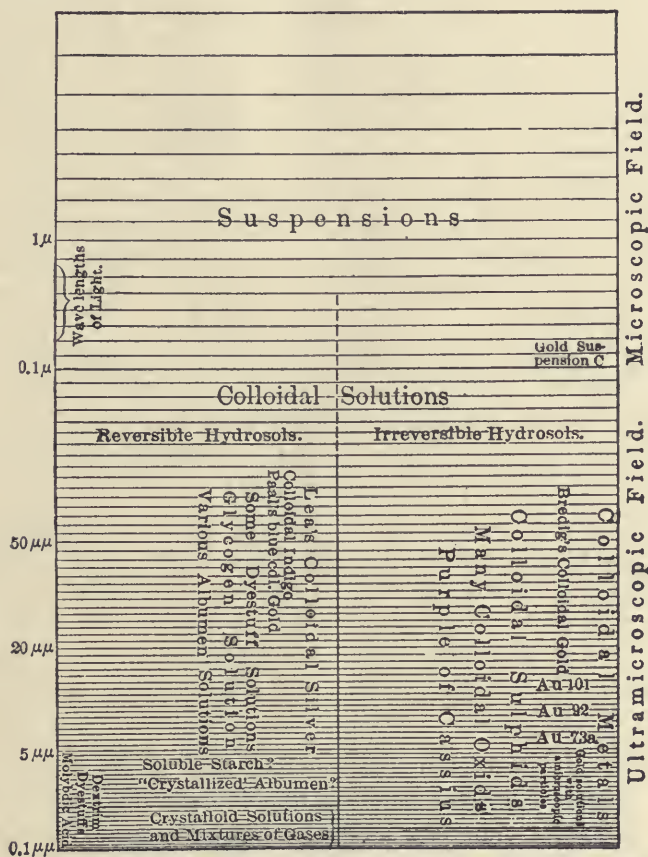


FIG. I. Classification of Colloidal Solutions according to the size of the particles contained in them and according to their behavior upon dessication.

A most interesting property of reversible colloids is that they can protect irreversible colloids from coagulation and permit them to redissolve after dessication: Thus as little as $\frac{1}{10,000}$ of 1 per cent. of gelatin produces this effect in a solution of colloidal gold. Such action is known as *protection* and a reversible colloid ex-

* Gengou classifies them as stable and unstable colloids respectively.

† Colloids and the Ultramicroscope, John Wiley & Son, 1909.

hibiting it is known as a *protective colloid*. This power of protection is specific and a reversible colloid may protect one substance and not another.

A very simple experiment will show the great influence of a protective colloid in keeping the product of a coagulation or precipitation in an extremely fine grained colloidal state. A solution of nitrate of silver is divided into two tubes, to one of which is added a very small quantity of gelatine solution. Upon adding dilute HCl. to each tube, the one without gelatine (the protective colloid) immediately exhibits the well known flocculent precipitate of AgCl., whereas in the other tube there is produced only an opalescent hydrosol or colloidal solution in which the particles of AgCl. are so finely divided that they pass completely through filter paper. For this reason protective colloids are frequently called "sol formers."

Let us now consider milk in the light of the principles of colloid chemistry which have just been briefly stated.

According to Leach's compilation from Koenig's *Chemie der mens. Nahrung und Genuss mittel* the following table expresses the average constitution of various milks:

	Sp. gr.	Water	Casein	Albumen	Fat	Milk-Sugar	Ash
Cows' milk	1.0315	87.27	3.02	0.53	3.55	4.88	0.71
Human "	1.03	87.41	1.03	1.26	2.29	6.21	0.31
Goats' "	1.0305	85.71	3.20	1.09	4.29	4.46	0.76
Ewes' "	1.0298	80.82	4.97	1.55	6.52	4.91	0.89
Mares' "	1.0347	90.78	1.24	0.75	1.99	5.67	0.35
Asses' "	1.036	89.64	0.67	1.55	1.64	5.99	0.51

In the past many analyses of milk have included the casein and albumen under the omnibus title of "proteids," thereby obscuring a most important and vital fact—the ratio of casein to albumen. The importance of this fact at once becomes evident when we state that casein is an *irreversible* coagulating colloid, whereas albumen is a *reversible* or protective colloid. Looking at the table we see that in women's milk and in asses' milk, which are the most easily digested by the human infant, there is a considerable excess of protective colloid, whereas in cows' milk the ratio is heavily the other way.

As is well known, mothers' milk is scarcely coagulated by acid or rennin, and by increasing the amount of protection in cows' milk it may be made to act in like manner, which is easily

proven by adding a small quantity of gelatin, gum arabic or other protective colloid (*eg.*, cereal gruel). Cows' milk thus treated is not as much curded by acid or rennin.

Besides studying the macroscopic effect of protection on the casein we made the following observations with the ultramicroscope:

Obs. 1. A number of specimens of human milk from women within the first fortnight of lactation exhibited a homogeneously bright field with the exception of the intense refraction from the fat globules. With the apparatus* we used this indicated the presence of *ultraparticles*† so small that they could not be individually distinguished.

A specimen from a woman in her eighth month of lactation, and another from a woman in her fourth month of lactation, examined five or six hours after it was expressed, showed a field with many ultraparticles individually visible and in rapid motion. Another from a woman in her tenth month showed, after thirty hours, some large ultraparticles and many very small and very rapidly moving particles in the brilliantly lighted background. These were smaller and in more active motion than any of the particles seen in cows' milk, which invariably showed fields full of dancing ultraparticles which we estimated were about $30\ \mu\mu$ (millimicrons) in size and had a motion the free path of which averaged $3\ \mu$ (microns). Some idea of these dimensions may be obtained from the diagram on the following page.

These observations agree in the main with those of Kreidel and Neumann,‡ excepting that with the illumination and magnification they employed the field given by human milk appeared black.

We used oil immersion and the more intense illumination of an electric arc (about 1,200 candle power) whereas they used a 500 candle power Nernst lamp and a dry objective. We also obtained a bright field in human milk with the Siedentopf-Zsigmondy ultramicroscope made by Zeiss.

* This consisted of

a. Leitz right-angled arc lamp (4 amperes) with condenser.

b. Leitz compound microscope, with a Leitz dark field reflecting condenser.

Ocular, No. 4, with micrometer.

Objective, 1-12 oil immersion, stopped down with a hard rubber funnel.

The milk was examined on thin slides and covered with a cover glass. Many of our preparations were made with milk diluted with distilled water, which was first subjected to ultramicroscopic examination.

† Abbreviation for ultramicroscopic particles.

‡ Archiv. für Physiologie Pflüger, Vol. CXXIII., 1908, p. 523.

We subjected skim milk to various influences and then observed it under the ultramicroscope.

Obs. 2. In diluted milk the particles are less numerous and farther apart and coagulating influences are delayed.

Obs. 3. Milk shaken in a blood pipette was seen to show an incipient coagulation. This was manifested in woman's milk by the presence of ultraparticles when none were present previously, and confirms the observation of Kreidel and Neumann.* In cows' milk thus shaken we observed a grouping of some of the ultraparticles already present into clumps of two and three. As is well known, in the manufacture of butter, both casein and fat are agglutinated by mechanical agitation.

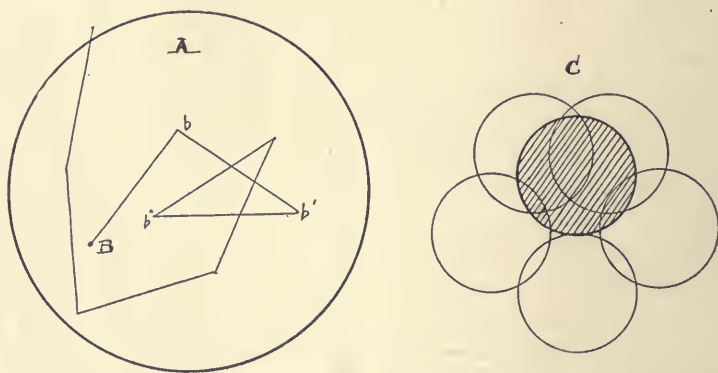


FIG. 11. Illustrating the relative sizes of red blood corpuscles, ultramicroscopic particles, and fat globules of milk; also the paths of the ultramicroscopic particles, and the "Brownian movement" of the fat globules.

A. Red blood corpuscle (7.5μ in diameter).

B. Ultramicroscopic particle ($.03 \mu$ in diameter).

B-b, b-b', b'-b'', etc. = average free path of ultramicroscopic particle, 3μ .

C. Fat globule, 2.5μ in diameter. Free path = 0.

Obs. 4. Milk subjected to the influence of heat.

(a) Boiled cows' milk showed an incipient coagulation by the presence of brighter and less active ultraparticles and sometimes clumps of two or four.

(b) Cows' milk sterilized at 100 degrees C. for one-half hour showed incipient coagulation.

(c) Cows' milk pasteurized at 50 degrees C. for one-half hour showed the same result.

(d) Some commercially pasteurized milk (160 degrees C. forty seconds) showed the same picture to a less degree.

* Loc. cit.

(e) We observed some whey and found no visible ultraparticles; but after boiling they appeared singly and in clumps.

(f) Boiled woman's milk resembles cows' milk unheated. There were no clumps of ultraparticles seen.

Obs. 5. We observed the influence of electrolytes on cows' milk with and without additional protective colloid.

(a) To some milk placed under the ultramicroscope we added some decinormal hydrochloric acid, which, as is well known, has a pecticising or coagulating action on casein. We observed the individual ultraparticles group together, the clumps showing shorter and less rapid excursions until they become so large and their motion so labored that they had only a "Brownian movement." Finally they grew so large that they sank to the bottom of the field, and could be seen with the naked eye. At times fat globules were included in the clumps. In human milk, additional ultraparticles were seen to appear on the addition of hydrochloric acid, or, when they were present, they grew in size and the field, which had been bright, became darker. No clumping, however, was seen.

(b) If gelatin, a protective colloid, was added to the cows' milk before the acid, the grouping together of the particles was delayed or even entirely prevented.

Protective colloids have an analogous effect on the growth of crystals, as has been observed by one of us (Alexander).*

The effect of gelatin in preventing the coagulation of milk by hydrochloric acid was observed by Jacobi† in 1889, and again by Auzol‡ in 1907 in macroscopic observations.

In general it has been found by Chana Smeliansky§ that alkaline electrolytes oppose the pectization or coagulation caused by acid electrolytes or other coagulants, and tend to produce deflocculation.

Lime water and decinormal NaOH added to milk did not make any difference in its ultramicroscopic appearance.

Obs. 6. The effect of rennin on cows' milk. Ultraparticles attached themselves to the small particles as nuclei, which appeared in the field after the addition of the commercial ferment, and the aggregations grew into larger and larger groups which finally became visible to the naked eye.

* *Zeit für Chemie und Industrie der Kolloide*, Vol. IV., p. 86; *see also ibid.*, Vol. V., p. 203.

† *Intestinal Diseases of Infancy and Childhood*, Vol. I., 1890.

‡ *Theses de Paris*, 1907.

§ *Archiv. für Hygiene*, Vol. LIX., 1906, p. 187.

The action of rennin was seen to be delayed and even inhibited by the addition of small quantities of gelatin solution. Mothers' milk showed no clumping in the specimen we examined.

Obs. 7. In connection with the marked inhibitory action of sodium citrate to coagulation, we observed that the commercial salt is acid to phenolphthalein and neutral to litmus. The crystals seem to have the structure of an agglutinated group of ultra-particles; when going into solution it exhibited actively moving ultramicros. This salt evidently acts not as an electrolyte, but as a protective colloid.*

Our observations served to show us the importance of the subdivided condition of the casein of milk. This influence of "protection" is not, however, confined to the casein, but probably is important in maintaining the emulsion of the fat. In milk which contained very small fat globules we observed them kept in constant motion by the continuous bombardment of ultraparticles.

The effect of colloids (gums and albumen) in forming and maintaining the emulsified condition is applied daily in pharmacy and in the kitchen.

The importance of the protective action of colloids in preventing the curds from becoming tough and leathery may be estimated from our observation outlined above.†

Curds which contain much fat tend to cohere; these, as well as tough and leathery curds find difficulty in passing the pylorus. But even after the pylorus is passed the process of digestion or peptonization must reverse the coagulation or pectonization which has occurred in forming curds, and the more tough and leathery these curds are the more digestive work must be done, if, indeed, it can be completed at all in the absence of sufficient protective colloid.

It has, moreover, been shown by Hugo Popper‡ that casein uncurded by rennin is more completely digested by trypsin than when curded.

We have not in this brief paper considered the effect of excess of protection, nor have we considered which colloidal element of milk has to do with the preservation of the fat emulsion; nor the condition of the mineral constituents of milk, though there are some reasons for our believing that some of these latter exist in

* See Bordet-Gay, "Problems of Immunity," John Wiley, 1909.

† See also "Milk in its Relation to the Public Health," Bulletin No. 41. Hyg. Lab., U. S. Pub. Health and Mar. Hosp. Serv., Washington, p. 658, et seq.

‡ Popper, Archiv. für Physiologie (Pflüger), 1902, Vol. XCII., p. 605.

the colloidal condition. These and other allied questions are reserved for a later paper.

The practical bearings of colloids in milk are far-reaching, for it gives us an additional standard which must be considered in dietetics. Its bearing on the treatment of disease has already been hinted at by Dr. Herter in his work on "Infantilism." He remarks in a foot-note, after considering the use of gelatin in the cure of this condition, that apparently small quantities of gelatin have the same effect as larger ones. And this should be the case if we interpret his observations from the viewpoint of Colloidal Chemistry and assign to the "protective action" of certain colloids their due measure of importance.

CONCLUSIONS.

(1) The casein of milk is an irreversible, or coagulating, or unstable colloid, which is protected by lactalbumen, a reversible or stable colloid.

(2) In the modification of cows' milk for infant feeding, it is necessary not only to consider the per cent. of "total proteids," fat, etc., present, but to see that the casein is adequately protected. Lest we be misunderstood to be only restating the principle expressed in the doctrine of "split proteids," we would emphasize that the casein exists in cows' milk in an already formed higher degree of colloidal aggregation.

(3) Bald chemical analysis, without taking into consideration the principle of colloidal protection, is an insufficient criterion for the actual digestibility or availability of food.

CLINICAL MEMORANDA.

REPORT OF A CASE OF LONG-STANDING EMPYEMA WITH A NOTE ON RACE AS A PREDISPOSING FACTOR IN THE OCCURRENCE OF EMPYEMA.*

BY ALFRED HAND, JR., M.D.,
Philadelphia.

It is difficult to determine from the history of this case the length of time during which the purulent pleural effusion existed, but my own belief is that it had probably been present for a year and a half, or perhaps even twenty-two months.

The patient, a girl, was three years and five months old, and weighed eight pounds and fourteen ounces when admitted to the Children's Hospital. Nothing could be learned of her parentage; at six months of age she was taken from a city institution to the country and placed in a private family under favorable surroundings. The only point ascertainable about the feeding was that she was at first fed on a mixture of cows' milk and barley-water. She never had any contagious disease, but when fourteen months old there was a report (to the institution from which she went to the country) that she "still had bowel complaint." Subsequent reports were:—

At eighteen months; has been very sick but is better; one week later, again very sick.

At nineteen months; has always been a very delicate baby; has a wasting disease with little hope of recovery. Two weeks later, some improvement is shown and the physician now thinks there is a possibility of recovery.

At twenty-one months; has been very sick again; the physician is surprised that she has lived so long and thinks her parents must have had consumption.

At twenty-three months; is a marasmus baby and is very sick.

At twenty-five months; is very delicate.

* Read at the Meeting of the American Pediatric Society, at Lenox, Mass., May 27, 1909.

At thirty-two months; the physician thinks she has gained slightly but she is still very delicate.

When admitted to the hospital the statement was made that she had a cough which had lasted for at least eighteen months, and that she sometimes vomited in the attacks of coughing. The bowels were usually constipated and prolapse of the rectum was of frequent occurrence.

The accompanying photograph shows her condition as well as a verbal description, but neither can convey the uncanny sight presented by the child when stripped for examination. The most striking features, at first glance, were the absolute emaciation and the distention of the abdomen. The latter suggested an abdominal



FIG. I. M. C., $3\frac{1}{2}$ years old, weight 8 lbs. 14 oz., showing distention of abdomen and depression of left chest.

growth or hypertrophic dilation of the colon, but both of these could be definitely excluded on examination. As the child moved the flail-like arms over the trunk, with the hands which looked like claws scratching the skin, it required an effort to realize that the patient was a human being, and the sight was one from which many turned away with a shudder. The photographs show well the difficulties encountered in a physical examination of the chest and are our only excuse for not detecting the empyema immediately on admission.

From the notes made when the child was admitted the following are extracts:—Head is frightful to behold; eyes are sunken; ears are prominent. Fontanel is closed. Teeth, eighteen in number, are irregular and poor. Tongue clean, throat clear.

Chest is much deformed on the left, the ribs in the cardiac region being depressed while the lower ones flare out. There is a marked lateral curvature of the spine, with the concavity toward the left (Fig. II.) which does not straighten out on lifting the child by the shoulders. Over the lower part of the back the skin has some areas which are perfectly white, varying in size up to 1 cm. in diameter. Over the sacrum there is considerable long hair and below this are some scars of recently healed sores.



FIG. II. Same as Fig. I., but showing lateral curvature of spine, contraction of left side, white area of skin at point marked X, and extreme flexion of left forearm on arm.

The examination of the lungs was difficult because of the diminutiveness of the thorax, the emaciation and the crying, which occurred whenever the child was examined; but the right lung seemed perfectly clear and the cry seemed to be transmitted well over the left side.

The apex beat of the heart was in the third inter-space in the midclavicular line and the heart-sounds were normal.

The walls of the abdomen were so thin that the coils of intestine were plainly visible. The liver and spleen were not palpable and no

masses could be detected beneath the relaxed abdominal muscles.

A few black and blue spots were present on the chest, epigastrium and right thigh. Other similar spots appeared in many parts of the body from the traumatism of even the most gentle handling; thus, drawing the cheeks forward so that the milk would not run out of the mouth caused ecchymoses where the nurse's fingers rested.

The mental condition was that of backwardness; the child was unable to talk but the expression was not that of an idiot.

Three days after admission the weight had increased one pound, which proved to be the maximum attained, most of the increase being due to undigested milk lying in the intestines; fifty-six ounces being taken in twenty-four hours. This amount

had to be reduced, as the digestive organs could not handle it, great abdominal distention following. The weight then fell to nine pounds, four ounces, after which there was a slow gain again up to nine pounds, fourteen ounces, with a slight loss after she was transferred to the surgical wards.

Some of the measurements were:—Length over all 70 cm. (27.5 inches). Length of foot, 10 cm. (4 inches). Fronto-occipital circumference, 42 cm. (16.5 inches). Girth of abdomen at umbilicus, 42 cm. Girth of abdomen midway between umbilicus and ensiform, 46 cm. Circumference of middle of upper arm, 5.5 cm. ($2\frac{1}{8}$ inches). Circumference of forearm in largest part, 7 cm. ($2\frac{3}{4}$ inches). Circumference of calf 6.5 cm. Circumference of thigh, middle, 7.25 cm. The urine was negative except for a faint trace of albumin. The blood-count gave 55 per cent. hemoglobin, 4,780,000 red cells and 15,000 leukocytes.

After some days of study, we at length became so accustomed to the weird sight that we were able to recognize that the right chest measured 22 cm. and the left only 20 cm., that over the latter the breath-sounds were absent and the percussion-note was dull, almost flat, and that the right border of the heart was distinctly to the right of the sternum. Through an exploring needle inserted in the third interspace in the left anterior axillary line, thick green pus was withdrawn containing streptococci; examination for tubercle bacilli was negative. The needle of an aspirator was then inserted and one ounce was obtained, but as the flow then presented a tinge of blood the suction was shut off. When the needle was pushed in, there was a grating sensation as though it was passing through either a very dense or a calcareous pleura.

On the following day, my surgical colleague, Dr. Jopson, resected an inch of the seventh rib, under cocain-infiltration-anesthesia, finding a dense fibrous pleura about a quarter of an inch thick; about an ounce of green pus was obtained, the child standing the operation very well. The wound discharged properly, but showed no tendency to heal and one month later, in a Philadelphia hot wave, the child succumbed.

An autopsy revealed nothing beyond the compressed, airless, fibroid left lung, with the greatly thickened pleura. All of the other organs were normal, with the exception of a relative, moderate dilation of the stomach and intestines.

The above is an extreme and unusual illustration of the result of overlooking an empyema, and may help to emphasize the

importance of recognizing the condition at the earliest possible moment. Without discussing at the present time the diagnosis of empyema, I may say that one of the most suggestive points is a temperature which remains moderately elevated (100°F.) after the crisis of a pneumonia. Two years ago, while examining a colored child whose temperature was behaving in this way, the thought suddenly occurred to me that I had never seen an empyema in a negro. Since then watch has been kept with special reference to this point, and the records of the Children's Hospital have been consulted for the past ten years. My thanks are due to my colleagues on the staff for the courtesy of allowing the use of their cases, and also to Dr. J. K. Walker for his valuable aid in collecting the figures. In that time there have been 1,109 cases of pneumonia in white children with 99 empyemas, or 9 per cent. There have also been 245 cases of pneumonia in colored children with 3 cases of empyema, or 1.2 per cent.

A study of these 3 cases would justify the conclusion that only 1 could reasonably be classed as the metapneumonic form of empyema. The first one, occurring in an eleven-months-old infant, gave 2 drams of pus containing diplococci, the autopsy showing a pleuropneumonia. The second one gave signs of bronchopneumonia, with a pleural effusion on one side; in a hard coughing spell a large amount of pus was expectorated and signs of a pyopneumothorax developed; death occurred in a few days and the autopsy showed a perforation in the bronchus with pus and air in the pleural cavity; there was also a widespread general tuberculosis, and it is very likely that the effusion was primarily serous, perhaps becoming infected on the development of the pneumothorax. The third case had a large purulent effusion, which gave a pure culture of the typhoid bacillus. If we exclude these 2 cases their places might be filled by 2 cases which have occurred in my service this year and were of the regular metapneumonic type, diplococcal in origin. Even if all are admitted there is still a wide difference in the susceptibility of the white and colored races to empyema. An interesting point is raised by the fact that the 2 which occurred this year were in mulattoes, not in full-blooded negroes. The number of cases is, of course, too small to decide whether, in the admixture of the races, the susceptibility of the white or the immunity of the negro will triumph.

DISCUSSION.

DR. FREEMAN.—In regard to the operation I would like to say that in my experience at the Foundling Hospital resection of the rib in these cases is absolutely unnecessary. It produces considerable shock and causes deformity of the chest. Autopsies have shown that a tube inserted between the ribs provides efficient drainage.

DR. ADAMS.—In regard to the difficulty of diagnosis, some years ago I had a case which presented all the symptoms, even obliteration of the intercostal spaces, and in the presence of the staff I introduced the needle and got pus. The child was handed over to the surgeon, who did not find any pus in the pleural cavity. The child died in a couple of days and postmortem showed an abscess at the spot where the needle had gone in.

This winter I saw 2 cases—one in private practice in which the needle was introduced and with the syringe pus withdrawn. He was turned over to the surgeon, who failed to find anything in the pleural sac. The child finally died of abscess of the lung.

About 40 or 50 per cent. of cases in our hospital are negroes and there are a large number of cases of pneumonia, and yet I could not recall a case of typical empyema in a negro which accords with Dr. Hand's experience, but a case occurred recently with a history of empyema. I took the precaution to state that a thickened pleura would sometimes obscure things and that I was not quite sure. A student, under my direction, introduced the needle and the pus came out promptly. I remarked that the lung must be very much retracted, as he had gone in the length of the needle. The case was turned over to the surgeon, and not a drop of pus found in the pleural sac. He had gone into an abscess. In none of these three instances did any harm result, but the diagnosis in these cases is very difficult.

DR. ROTCH.—Non-tubercular empyemas almost invariably get well. They may break into the abdomen or into a bronchus, but if properly treated surgically they get well in almost every instance. We still resect the rib in our cases and do not get much malformation.

DR. HAND (in closing) agreed with Dr. Freeman as to resection of the rib. He preferred simply to put in a drainage tube.

THE USE OF THE MORNING'S MILK FOR INFANTS.—Berger (*Münch. Med. Woch.*, June 1, 1909) says that when possible the morning milk should be used for infant feeding, as it is much more fresh and contains fewer bacteria than the milk of the night before. It must, however, be remembered that this milk is poorer in fat than the evening milk, and must therefore be given in somewhat larger quantity.—*Boston Medical and Surgical Journal.*

AN UNUSUAL PERSISTENCE IN THE SECRETION OF COLOSTRUM.

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New Haven, Conn.

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On August 14, 1909, I was called to see a white baby, then fourteen days old, weighing 6 pounds, 4 ounces, the complaint being a continual loss of weight since birth. She was the first child born at full term of a mother well and strong in every way, twenty-seven years old. The delivery was normal, the baby weighing 7 pounds, 5 ounces. She was being nursed regularly every two hours, took the breast well and was seemingly satisfied, although she had lost 17 ounces during the fourteen days of her life. There had been no vomiting nor regurgitation; the stools had been frequent, five to six a day, but reported by a competent nurse normal in color and consistency generally, although the last few days a little greenish, containing some mucus and curds. Those saved for my examination were decidedly green, a considerable quantity of mucus mixed with both fat and proteid curds being evident. There had been no fever nor manifestation of any indisposition. She nursed well, but was not apparently hungry; her sleep was good both day and night. About her buttocks there had been and was considerable "scalding," and her skin had been always decidedly dry with tendency to scaling. Two days before my visit a seborrheic eczema had appeared on her face and chest quite acute and angry. Beyond the above physical examination was negative, excepting her hands and feet were blue and cold, necessitating hot-water bags in her bassinet. Her heart and lungs were negative, and beyond being underweight small, pinched in expression and apparently anemic, she was as strong and vigorous as any child of her age.

As she had lost 17 ounces since birth and I could find no physical cause in the baby herself, I naturally turned to the mother. She had gone through her confinement normally, was just sitting up and was in general good condition, with the exception of a slight constipation easily controlled by a fig and

senna paste prescribed by her physician. Her lacteal glands were well developed and she had an abundant supply of milk, which was not being in any way forced by large amounts of milk-producing fluids. By "thumb-nail test" I noted it a very rich yellow, smooth, thick and apparently well emulsified. Taking a sample for analysis it stood in my ice chest ten hours before given to Professor Underhill, of the Sheffield Scientific School. It then had a thick layer of cream resembling butter, the whole specimen being deep yellow, with perhaps a slight olive tint in certain angles of light.

Professor Underhill reported: Fat, 3.60 per cent.; proteid, 1.71 per cent.; Sp. Gr., 1.030. He also noticed the peculiar color. This analysis not varying markedly from the average, and giving no indication why the baby should not thrive, it occurred to me, on account of its color, I might be dealing with colostrum even at this late date. In consequence, I obtained another sample, which I examined by microscope to find it typical colostrum. The vast majority of corpuscles were colostrum bodies, and the fat globules were hardly any two of nearly equal size, varying from minute to exceptionally large.

At the time the second sample was obtained (late in the evening of the same day) the rash on her face was much worse; she was refusing the breast and eager for water. She was given castor oil, put on boiled water for the remainder of the night and taken absolutely from the breast. The next day her weight was 6 pounds, having lost 4 ounces in twenty-four hours. Weaning her with partially peptonized cow's milk (4 ounces of 10 per cent. in a 20 per cent. mixture). She did well, gaining 4 ounces in the next twenty-four hours, her complexion clearing in eight days, and from then until now, October 17th, when she is eleven weeks old, has not had an upset and weighs 10 pounds 12 ounces, a gain of 4 pounds 12 ounces in nine weeks.

The mother being willing to allow her milk to dry without artificial aid, and there being no counterindication, it persisted three weeks, the last examination showing precisely the same picture of colostrum as the first. In total, then, the colostrum was secreted thirty-two days, for I feel fair in assuming the secretion from the start of lactation (the third day after confinement) to the time of my first examination, when the baby was fourteen days old, was colostrum, as it continued to be afterward until the breast dried.

REPORT OF A CASE OF CONGENITAL MUSCULAR DYSTROPHY.*

BY KAUFMAN SCHLIVEK, B.S., M.D.,
New York.

Fannie G., aged two years and three months.

Family History.—Negative. No consanguinity, no similar cases among the relatives. Parents are healthy. There is one other child; he is ten months old and is normal.

Previous History.—First child. Forceps delivery. Breast fed. She held head up at three months, sat alone at eight months. First teeth appeared at nine months. Said “papa” and “mamma” before she was ten months old.

The present condition dates from birth. The child has never been able to properly flex the elbows or the knees, and the feet have always been turned in. The mother says that the child did not move the arms until she was six months old, when she began to raise them slightly. She moved the legs from birth. For the past few months she has been able to stand with support.

Examination is negative except for the extremities.

The upper extremities are held in the position of Erb’s paralysis, that is, in complete extension at the elbows and rotated inward. The anterior part of the arms is flat, soft and flabby. The posterior is better developed, but also soft and flabby. The anterior surface of the humerus is easily felt. The shoulders are fairly well developed. The forearms are well developed. When the child reaches for things she doesn’t flex the elbows, but uses the shoulders; and, at the shoulders, passive motion is free, but active motion is limited. She can raise the right arm to almost 90° and the left a little higher. At the right elbow active and passive flexion is limited to 30°; at the left elbow to 60°. Pronation and supination of forearms are good. Motion in the wrists, hands and fingers is normal.

Lower Extremities.—The muscles of the thighs and legs are soft and flabby. Passive motion at the hips is not limited. Flexion at the knees is limited to 45°. There is marked lateral motion in the knees, especially inward. At the right knee lateral

* Presented at New York Academy of Medicine (Section in Pediatrics), December 9, 1909.

motion is greater. There is marked creaking in the knees. The feet are in the position of talipes equinovarus.

The back muscles are well developed. There is lordosis when the child stands, but not when she sits.

Knee-jerks are present.

Superficial reflexes are normal. Sensations are normal.

The electrical reactions show only quantitative diminution in all the muscles of the extremities to faradism and galvanism; no reaction of degeneration.

The X-ray examinations were made by Dr. Jaches, radiographist to Mount Sinai Hospital. He skiagraphed the entire skeleton. The only conditions worthy of note are that the articular surfaces of the elbows and those of the knees are in closer proximity than normal. The bones of the ankles are underdeveloped, that is, there are the centres of ossification of but four tarsal bones instead of the seven. The os calcis is displaced upward.

I have seen the child a few times in the past eight months and have observed some improvement. Mentality is excellent; the child understands and talks well. For the past few months she is able to stand for a short time, supporting herself at a chair, and when held by the arms she attempts to walk.

To determine the diagnosis of this case we have to consider the bony, nervous and muscular systems.

We can eliminate the bony system, for the skiagrams show no obstruction to motion.

We can exclude the nervous system, for no lesion of the nervous system, central or peripheral, will give such a peculiar distribution of symptoms; there are no trophic disturbances, sensations are normal, and there is no reaction of degeneration.

Since we have eliminated these conditions, we must refer to the muscles. The only conditions referable to the muscles are congenital myatonia (Oppenheim's disease), congenital myotonia (Thomsen's disease), and congenital muscular dystrophy.

In congenital myatonia there is general flaccidity of the skeletal muscles, excepting those supplied by the cranial nerves. It varies in degree; in extreme cases the limbs are mere useless appendages, that is, there are flail joints. The muscles are soft and atonic. They react feebly, or not at all, to electricity.

In congenital myotonia there is stiffness accompanying the beginning of every muscular movement, which passes off on con-

tinuance of the act and again accompanies the termination of the movement. The myatonic reaction to electricity is present.

The only other condition is muscular dystrophy, and, from the symptoms described, this case corresponds to the latter diagnosis.

In confirmation of this diagnosis, I wish to refer to a paper by Dr. Russell Howard in the Proceedings of the Royal Society of Medicine, 1907-1908: "A Case of Congenital Defect of the Muscular System (*Dystrophia Muscularis Congenita*), and Its Association with Congenital Talipes Equinovarus."

The case was one of twins; it lived seven days. The other one was stillborn. The report is very thorough; there was a complete dissection of the whole anatomy, with descriptions of both macroscopic and microscopic findings. The specimen described is similar to this case, but with much more marked deformities.

His examinations show that the primary lesion is in the muscles; also that it is a degeneration of the muscles, as in the regular pseudohypertrophic muscular dystrophy.

In explanation of the joint deformities he says: "The surfaces of the bones on which articular cartilage is found correspond exactly with the places where the bones are in contact, and it is obvious that the places of contact determine the condition and shape of the joint surfaces. In a normal fetus which moves its limbs freely in utero, the joint surfaces are extensive and adapted to the various movements, but in the fetus under consideration movements must have been absent or very limited, and as a consequence the joint surfaces are limited to the places of contact and, as has been shown, the surfaces are situated in abnormal positions."

He reports 2 other cases:—

CASE I. The upper extremities were in the position of Erb's paralysis and the joints were fixed in abnormal position. The lesion remained limited to the upper extremities and did not progress.

CASE II. A child of nine years old, who had double talipes equinovarus and both upper extremities in the position of Erb's paralysis. The only active muscles were those of the trunk and neck.

These cases are very similar to the one here reported.

A CASE OF CONGENITAL STENOSIS OF THE DUODENUM.*

BY ROWLAND G. FREEMAN, M.D.,

New York.

Congenital obstruction of the duodenum, although very rare, is occasionally found, and inasmuch as the symptoms produced are quite similar to those found with congenital hypertrophic stenosis of the pylorus, the possibility of such a lesion should be borne in mind when these symptoms of obstruction in this portion of the alimentary tract occur.

Congenital obstruction may occur in various parts of the intestine and in one of the recent collections of cases—that of Kuliga†—of a total of 185 cases of occlusion of the intestines, 45 were found in the duodenum.

Of 57 cases of occlusion of the duodenum, collected by Cordes,‡ 48 she classes as atresia and 9 as stenosis.

There is, however, a third class of congenital obstruction of the duodenum which neither forms a complete obstruction termed atresia or an almost complete obstruction termed stenosis, but through folds of the mucous membrane causes a valve-like obstruction. One case of this sort has been reported by Preisich,§ where there was a double valvular occlusion. He quotes 3 other cases of similar occlusion.

Besides the 57 cases recorded by Cordes, others have been reported more recently by Schukowski,¶ one by Taillens,|| that of Preisich, and the case reported before this Society by Drs. Shaw and Baldorf.** These make, with the case that I am to-day reporting, 63 cases.

The cause of this condition is unknown. Etiological factors

* Read before the Twenty-first Annual Meeting of the American Pediatric Society, May 27, 1909.

† Beltrage sur Pathol. Anatomie., 1903, p. 481.

‡ ARCHIVES OF PEDIATRICS, June, 1901.

§ Jahr. für Kind., 1903.

¶ Med. Rundschau, 1903.

|| Rev. Med. de la Suisse, Vom. XX., March, 1903.

** ARCHIVES OF PEDIATRICS, 1907, p. 813.

that have been mentioned are syphilis and pressure by the head of the pancreas. It is also noteworthy that the position of this occlusion is also the position of an occasional diverticulum and that the position of the Merkel's diverticulum is also the position of an occasional congenital occlusion.

I am indebted for this specimen, the history and the autopsy notes to Dr. W. Morgan Hartshorn, with whom I saw the case in consultation.

The male child, from whom this specimen was obtained, was born of a primipara, who had gone through pregnancy without symptoms, and had had a short, normal labor. The child was asphyxiated at birth, but soon appeared normal.

For twenty-four hours the baby showed no symptoms, but on the second day after nursing it was noted that no urine had been passed, and the baby vomited matter of a dark brown color and fluid, but after stomach and colon washing the vomiting was apparently controlled. On the third day there was no vomiting. Meconium was passed from the bowels, and the baby became markedly jaundiced. On the fourth day, as the baby would not take the breast and seemed very weak, it was fed breast milk, an ounce at a time, as well as a modification of cow's milk by gavage. At this time the vomiting was continuous and projectile.

On the fifth day frequent vomiting continued, the jaundice was marked, the stomach was washed and the child was fed by gavage.

On the sixth day when I saw the child it was very emaciated, markedly jaundiced, very weak and refused to nurse. No peristalsis could be discovered. A light yellow material in some of the movement seemed to indicate that some milk had passed into the lower bowel. The child did not seem in a fit condition for operation. The following day it was better, and nursed a little. On the eighth day also the child seemed to be doing fairly well. On the ninth day, however, the vomiting became worse, and on the tenth day the child died. The temperature was never above 99°.

Autopsy.—Markedly jaundiced. Weight, about 6 pounds. Anterior fontanel large. Several hemorrhagic areas on face and body. Umbilical cord partially separated. On opening the abdomen, the stomach presented itself, showing apparently two dilated portions with a small constriction two-thirds of the distance

toward the pylorus. This constriction was shown later to be the pylorus, the second dilated portion to be the dilated duodenum above the stricture. Air could be forced through the pylorus from the larger to the smaller cavity. The duodenum near the constriction was firmly bound down by adhesions, which were deeply bile-stained.

The stomach capacity was about three times that of the di-



STOMACH AND DUODENUM OF A CASE OF CONGENITAL STENOSIS OF THE DUODENUM.
At A the duodenum is cut open to show the point of stenosis.

lated duodenal cavity. The walls of the stomach were much thicker than the dilated duodenum.

The pylorus was normal and patent. The stenosis of the duodenum was complete, and surrounding this was a large amount of connective tissue. The point indicated by A in the illustration is the point of stricture.

The stomach measured $4\frac{1}{2}$ inches in length, while the dilated duodenum measured 2 inches in length. Sections of the wall of the stomach and duodenum were examined and showed nothing abnormal.

MISCELLANY.

SOME GLIMPSES OF PEDIATRIC WORK IN AUSTRIA AND GERMANY.

BY JEROME S. LEOPOLD, M.D.,

New York.

From New York it is a good plan to sail to Naples, and then to come to Vienna through Italy. Both on account of the large amount of material in Vienna, and because one can receive so much instruction there, it seems to me best to visit Vienna first and to remain there as long as one's time will permit, and then to go to the other cities and clinics of Austria and Germany. The best season of the year to begin work in Vienna, as well as in any of the other Austrian or German cities, is in October. In October all the men have returned from their long summer vacations, and the University lectures begin at the end of this month. Of course, one can find work to do during the whole summer, but the chiefs of the clinics are usually away during this time.

In Vienna one can live at any of the large hotels on the "Ring" (Bristol, Grand, Imperial), or if one wants to be near the hospitals there is a rather good small hotel called Hôtel de France. It is very advisable, however, to procure a suitable pension as soon as possible if one intends to remain any length of time in Vienna, because the hotels are expensive, and not at all good. It has always seemed strange to me that a city as large as Vienna should not have even one first-class hotel. The first thing to do after procuring accommodation at an hotel is to visit the Café Klinik in Spitalgasse. Here are the headquarters of the Anglo-American Medical Association for the time being. Here the lists of courses and pensions are kept, and here there are always American doctors who are ready to give information. The Anglo-American Medical Association holds a meeting every Friday evening at eight o'clock in the Wagner Hörsaal in the Krankenhaus. At first there is a lecture by some Viennese physician of note and then a regular business meeting. These meetings are always well attended.

The material in diseases in children is larger and better in Vienna than in any other city of Austria or Germany. And almost all the hospitals are in one district, which enables one to visit several clinics in one day.

The St. Anna Spital is the University Children's Hospital. Its chief of clinic is Hofrat Professor Escherich. His staff consists of the following assistants: Jehle, Sperk, Reuss, Schick, Sluka, Monti, Rach, Grüner and Koch. This hospital contains about 125 beds, including a large infant department, under the charge of Sperk and Reuss, and separate buildings for diphtheria, scarlatina and measles. Then there is a "milk kitchen," which provides milk for about 500 infants daily, and to which the mothers bring their infants from time to time for observation. There is a dispensary connected with the hospital, where anywhere from 150 to 300 cases are seen daily. Besides, there are well equipped laboratories for chemistry, bacteriology and pathology, an animal room, a Roentgen room, and a well-kept and complete library. The hospital itself is a rather old one, but the plans for a new hospital have been ready for some time, and it is expected that the work on the building itself will soon begin. Escherich lectures on Mondays, Wednesdays and Fridays, from 8 until 10 in the morning in the lecture room of the hospital. Here, about once a month the Vienna Pediatric Society meets in the evening. Escherich is a brilliant talker and his lectures are extremely interesting.

Escherich does not make regular visits in the wards, but his first assistant does—from about 8 to 10 every morning. Work goes on in the dispensary from early morning until late at night. Courses are given in infant feeding by Sperk and Reuss and in intubation and tracheotomy by Schick. Other courses are given in ward and dispensary work by the various assistants. Full information concerning these courses can be obtained from the Year Book of the Anglo-American Medical Association at Café Klinik.

In any of the hospitals in Austria or Germany a foreigner who has a knowledge of German can serve for a period of months or years as voluntary assistant. The duties of the voluntary assistant vary in the different clinics. At most clinics a voluntary assistant has about the same duties to perform as an interne in our American hospitals. There is always plenty of material, and plenty of time for original research work. The chiefs of the hos-

pitals make it a point to encourage the men to work in the laboratories.

Near the St. Anna Spital is the Vienna Polyclinic. Here in the children's department is Hamburger, who was formerly Escherich's first assistant. Hamburger is known the world over for his many excellent works on tuberculosis in infants and children. He gives courses in general paediatric work in the afternoon, and his courses are well worth taking. He has a large dispensary, as well as several hospital wards.

Another large children's hospital in Vienna is the Carolinen Hospital, which is under the charge of Knöpfelmacher. It has 75 beds, including a small department for infants, and three buildings for infectious diseases. Knöpfelmacher makes rounds every morning and gives courses during certain months of the year. There is also a large dispensary connected with this hospital.

The newest and most complete children's hospital in Vienna is the Franz Joseph Kinder Spital, under the charge of Moser. Most of the cases here are chronic ones. There is also a foundling's home near the St. Anna Kinder Spital. Zarfl is resident physician. Most of the infants are admitted with their mothers, and thus receive breast milk.

In the Allgemeines Krankenhaus, Lorenz, the orthopedist, has his clinic. Here every morning one can see a wonderful assortment of bone and joint cases in infants and children. Lorenz and his assistants operate here nearly every day.

Besides the work in all these children's hospitals, there are courses in Neurology, Eye and Ear, and Skin (chiefly at the Riehl and Finger Clinics), where daily many children are shown.

Truly, Vienna is very alluring to one interested in pediatrics.

From Vienna it is a seven hour trip to Breslau, where Czerny has his clinic. Czerny has the chair in pediatrics at the University in Breslau, but in April he is going to Strassburg, where he will have a new children's hospital, consisting of 280 beds. The hospital in Breslau is a small one (50 beds), but modern in every respect. There is no better equipped chemical laboratory in any hospital than here, and the hospital library is also a very complete one. What impressed me most about Czerny's hospital was his so-called "Tuberculosis Barracks." Here, and in the large garden surrounding the barracks, his tuberculosis patients are kept. They are dressed in one piece bathing suits—no

stockings and no shoes—and play around in the garden all day long. Czerny does not give tuberculin to his patients. He simply lets them run around or lie in the fresh air all day long, and feeds them well, and they all seem to be doing very well and are happy. Czerny lectures three times a week in the afternoon, and makes rounds every day at one o'clock. His rounds are very instructive, and are alone worth a trip to Breslau. The dispensary connected with the hospital is filled with patients from early morning until late in the afternoon. Sometimes the work is not over until nine o'clock in the evening. Each case receives a thorough examination, both clinical and laboratorial. And each case, as far as it is possible—and Czerny told me it is possible in nearly every case—is followed in after years to see, let us say, for example, whether its systolic murmur is really a hemic one or if the repeated attacks of sore throat did not have as their cause some underlying constitutional disease.

In Breslau there is also a Foundling Home of about 70 beds, under the charge of Freund, who was formerly Czerny's assistant, and Calvary. At present it is in a very old building, but in a year or so a large modern asylum will be completed with 150 beds and a large laboratory.

It is about a five hours' trip from Breslau to Berlin. In Berlin there is an Anglo-American Medical Association much like the one in Vienna, although not so well organized. Its reading-room and bulletin board are in Rotthackers Book Store, Friedrichstr 105. The regular meetings of this Society take place at the Restaurant Heidelberger Saturday evenings at eight o'clock. From 12 to 2 every day the President of the Society and many of its members meet in the Kronen Kafé, corner Karl and Friedrich Strasse.

If one intends to remain any length of time in Berlin there are two places where one can live—either in the hospital district, near the Charitéstrasse, or in Charlottenburg. In Berlin the hospitals are nearly all long distances from one another, and thus much time is lost in going from one part of Berlin to the other. In Vienna, on the other hand, as stated above, the hospitals are nearly all in one district.

Heubner has the chair in pediatrics in the University of Berlin. His hospital is a very modern one, and is well equipped with laboratories. Altogether he has about 125 beds. Heubner makes rounds in the mornings at 11, and lectures every day from

12 to 1. In the afternoon courses are given by his various assistants. His chief assistants are Reyer, Noeggerath, Rott and Niemann. The material that Heubner has is much less than one sees in Vienna, and there are many more assistants in Heubner's clinic, so that one gets less chance to examine cases. Vienna in this respect is far superior to Berlin. But Heubner himself is an excellent teacher, and his lectures are among the most interesting and instructive that I have attended. His demonstrations of the infectious diseases are especially noteworthy.

But Berlin has what almost every other city I have been to lacks, and that is a large modern infants' hospital, under the charge of a brilliant chief with a staff of good assistants. I refer to the Kinderasyl in Berlin, under the charge of Professor Finkelstein, and his assistants, L. F. Meyer, Rosenstern, Schwalbe, and Dessauer. There are about 200 infants in this hospital, and almost all, with the exception of the children of the wet-nurses, have some disturbance in nutrition. As soon as an infant is considered well, it is sent out of the hospital, and is brought to the dispensary from time to time for observation. Recently, a large milk kitchen, complete in every respect, has been added to the hospital. About 10 new cases are admitted to the hospital every day. The furnishings of the hospital are simple, but modern, in every respect. Meyer, Finkelstein's first assistant, makes rounds every day at ten o'clock for two hours, and during this time he talks very thoroughly about the various cases in the hospital and about Finkelstein's methods for treating them. Every day at about 12:30 Finkelstein visits the cases. Finkelstein's rounds are very informal, and often very interesting discussions take place between him and his assistants. Courses are given by the various assistants every month. Finkelstein himself gives a course in infant feeding once or twice a year—generally in October and March.

It is well worth while to remain in Finkelstein's Clinic for several months. Here one can learn infant feeding.

The Kaiser and Kaiserin Friedrich Kinder Krankenhaus occupies the most ground of any children's hospital in Germany. It was designed and built by Virchow and Baginsky. It consists of a large number of small buildings. Here are medical, infectious and surgical cases. It is some distance from the centre of Berlin, but this is an advantage in a way, inasmuch as the immense grounds are thus made possible. Baginsky is chief of

clinic here. He has at present over 200 beds, and plans have already been made for an addition of 100 more beds for skin diseases in children. Baginsky makes rounds at about eleven every morning. Several times during the year he gives courses.

The newest and most modern hospital in Germany, if not in the world, is the Kaiserin Augusta Victoria Muster Anstalt in Charlottenburg, which is under the charge of Keller and Langstein. This hospital has 50 beds for infants. Its laboratories and its library are works of perfection. There is also a stable connected with the hospital where the cows and goats, which furnish milk to the infants, are kept. In the large and complete laboratories voluntary assistants are always welcome.

Besides these hospitals in Berlin there are numerous polyclinics, under the charge of such men as Neumann, Bendix, etc.

There is a Pediatric Society in Berlin which meets about once a month in Langenbeckhaus on Ziegelstr. In this building there is also a large medical library. Admittance cards to this library can be obtained free of charge on application to Professor Ewald.

From Berlin to Munich is a twelve hours' trip, which can be broken up at Dresden. The chief attraction in Pediatrics in Dresden is the Infant Hospital in charge of Rietschel. Rietschel makes rounds in the mornings at about ten o'clock. His hospital contains about sixty beds.

In Munich the best place to live is the so-called "Medical Quarter." There are many small hotels and pensions here. Pfaundler is Professor of Pediatrics in the University of Munich. His hospital has just been rebuilt, and is very complete. As in almost all the children's hospitals on the continent, there are buildings for infectious cases connected with the hospital. Large new laboratories have been built. Pfaundler makes rounds every morning at twelve o'clock, and lectures from three to four. There is a small dispensary connected with the hospital, under the charge of Pfaundler's first assistant, Moro. What impressed me very much in Munich was the fact that there are not so many cases in the hospital, but every case is gone over very thoroughly and studied carefully from every point of view.

In this short article, I have attempted to describe the chief paediatric clinics of Austria and Germany. If my description assists in orientating men who come to Europe to study Pediatrics, then I shall consider that my aim has been accomplished.

701 Madison Avenue.

SOCIETY REPORTS.

THE NEW YORK ACADEMY OF MEDICINE.—SECTION ON PEDIATRICS.

Stated Meeting, Held December 9, 1909.

DR. ELI LONG, CHAIRMAN.

AMAUROTIC FAMILY IDIOCY.

DR. ISIDORE GOLDSTEIN presented 3 cases of amaurotic family idiocy in infants one year, sixteen months and fourteen months old.

DR. KAUFMAN SCHLIVEK presented a case of

CONGENITAL MUSCULAR DYSTROPHY

in a child of two years and three months. The diagnosis in this case was discussed by Drs. Henry W. Frauenthal, A. F. Hess, and K. Schlivek.

(For report in full see page 34.)

ANTERIOR POLIOMYELITIS WITH RIGHT HEMIPLEGIA.

DR. HENRY W. FRAUENTHAL presented a boy who had had anterior poliomyelitis in 1907, with a persistent paralysis of the right arm and right leg and the left side of the face, whom he compared with another child eighteen months of age with a left arm and leg and right face affection, due, however, to cerebral hemorrhage, probably from syphilis. Dr. Frauenthal had seen nearly 40 cases of poliomyelitis with facial involvement, and had photographs of 20 cases.

"PROTECTIVE" ACTION OF THE COLLOIDS IN MILK, WITH SOME ULTRAMICROSCOPIC OBSERVATIONS.

This paper was read by Dr. Jesse G. M. Bullowa, and is printed in full on page 18.

THE TREATMENT OF INTESTINAL INDIGESTION IN CHILDREN ON
THE BASIS OF THE EXAMINATION OF THE STOOLS
AND CALORIC VALUES.

DR. JOHN LOVETT MORSE, of Boston, and DR. FRITZ B. TALBOT, of Boston, presented this communication. They said that it was apparently taken for granted that the metabolism of children was essentially the same as that of adults. It was generally believed that young children required a relatively large proportion of carbohydrates in their food, and that they needed proportionately more proteids than adults. None of these points, however, had been scientifically proved. It seemed to the writer that, if the stools of children suffering from disturbances of digestion, especially of the intestinal type, were examined in order to determine what constituents of the food were not being utilized and the diet regulated on the basis of these findings, due regard being paid to caloric needs, much better results could be obtained than by the usual empirical methods. Their experience led them to believe that comparatively simple tests were sufficient to give results accurate enough to form the basis for satisfactory treatment. They had also found that it was a very simple matter to calculate the caloric value of the food and to regulate the proportions of fat, carbohydrates and proteids. They also found that it was easier to control the diet of a child than that of an adult, and that it was at least as easy to get the coöperation of the child in carrying out the diet as it was to get that of an adult. With regard to the caloric needs of children, it was probably not far from the truth to say that the average child of four years needed about 1,200 calories, or 70 calories per kilo in twenty-four hours; the average child of eight years, 1,400 calories, or 60 calories per kilo in twenty-four hours; and the average child of twelve years, 1,600 calories, or 50 calories per kilo in twenty-four hours. There was no objection to giving large amounts of proteids in order to meet the caloric needs when there were disturbances in the digestion of fats or carbohydrates. On general principles, however, it was wiser to keep the proteids down somewhere near the average need, because the metabolism of the proteids required more energy and the products of proteid metabolism were more difficult of elimination than were those of the fats and carbohydrates. An excess of proteids, therefore, required an unnecessary expenditure of energy and was consequently not

economical. In disturbances of digestion fat might be substituted for carbohydrates and carbohydrates for fat with great advantage, provided the total caloric value of the food was kept up. The fats might be entirely replaced by carbohydrates over considerable periods of time without doing any harm. There was a certain amount of risk in replacing the carbohydrates entirely by fats because of the dangers of developing acid intoxication. A table giving the caloric value and composition of the various foods commonly given to children suffering from disturbances of digestion was presented. With it they found it an easy matter to plan out a diet for a child to give not only the proper number of calories, but also the desired relations between the different food elements.

A child's stool was normally homogeneous; lumpy and mushy stools were pathologic. The reaction was weakly alkaline, weakly amphoteric or neutral. A very strong alkaline reaction suggested protein putrefaction. A strong acid reaction suggested disturbances in the digestion of fat. The microscopic examination showed a few remains of a vegetable nature, single yellow masses, a few muscle fibers, a few crystals, rare starch granules, and microbes. When acetic acid was added a few drops of fatty acid were seen in each field after heating.

The stools that deserved special mention were the fatty, the stools of carbohydrate indigestion and the catarrhal stools. The fatty stools were gray or white in color, dry or of clay-like or creamy consistency, acid in reaction and of a rancid odor. The carbohydrate stools were brown or golden-yellow in color, salve-like in consistency, acid in reaction, acid or sour in odor. The catarrhal stools showed an excess of mucus. It was often associated with protein putrefaction and a foul odor. The character and the quantity of the food taken in the twenty-four hours was known in every instance, so that for all practical purposes the children had had a test diet. The methods of examination employed were essentially those described by Schmidt in his work. The form, coherency, consistency, color and odor, and the presence or absence of extraneous matters were noted in the macroscopic examination. The microscopic examination was made with a low power objective and later with a No. 7 objective. Three slides were examined; the first contained very thin, crushed-out feces, which was examined in the fresh condition. Another

was stained with Lugol's solution and examined under the cover for starch. The third was stained with a saturated alcoholic solution of Sudan III. In the first specimen an excess of undigested muscle fiber, connective tissue or vegetable fiber could be studied, and pathologic elements differentiated. A preliminary estimation of the amount of neutral fat, fatty acids, soaps and starches could also be made. Under the second cover glass the starch granules would stain blue or violet and certain microbes would stain blue. There were practically no unchanged starch granules in a normal stool. An excess was always pathologic. Under the third cover glass neutral fat drops and fatty acid crystals stained red. Any increase in the amount of fat after the addition of acetic acid indicated the presence of a corresponding amount of soaps. The recitation of illustrated cases closed the paper.

DR. CHARLES GILMORE KERLEY said that he felt we were very much indebted to Dr. Morse and Dr. Talbot for coming to New York and presenting such an admirable paper. He said that he had occasion to treat a great many cases of intestinal disorders in children of different ages, and his observation was that the average child, if given a fair chance, will have a particularly good digestive capacity and digest a reasonable diet fairly well. In other words, he had not found that there were many children who had a poor starch capacity, or a poor proteid capacity, or a poor milk capacity. He did find many children whose starch, proteid or milk capacity had been over-taxed because they had been fed along one line largely. The diet in some children had consisted too largely in starch and in others of milk. These were the two most common errors made in the feeding of runabout children.

Dr. Kerley stated that he began with a general mixed diet at a comparatively early age, and much earlier than many physicians. He found that in correcting disorders of digestion due to dietetic errors that a wide range of diet, including meat, vegetables and cereals, was one of the best means of bringing about a cure of the trouble. While stool examinations could not be systematically carried out by many, he agreed with the readers of the paper that in certain cases it would be a means of clinical value.

DR. THOMAS S. SOUTHWORTH said that it seemed to him as though something had been now produced which all desired, namely, a means of securing an interpretation of the stools which

could be taught and placed in the text-books and read and understood by all. Unless we could know, by placing a proper interpretation upon the condition of the stools, what results we had obtained from the feeding, we could have no criterion upon which to base any intelligent changes in the feeding. The microscopic examination of the stools seemed to confirm what we have shrewdly suspected from simple inspection of the stools. Selter's work, published four years ago, taught us to interpret stools according to their odor, reaction and other evidences of putrefaction and fermentation, with some microscopic tests showing faults in the stools and faults in the types of the individual elements in the food. What had been presented went much further in that improved microscopic tests clinched the matter. By means of such an examination one might be able to anticipate difficulties, since the microscope might show that there was a non-assimilation of the food even before the symptoms came strongly to the front. In listening to the reports of the cases by Dr. Morse one was more and more convinced that after all the successful feeding of the child or infant meant a rationally mixed food of proper proportions. If an examination microscopically of the stools were made, one might more often make such changes in the diet as would result in benefit to the infant. The confirmatory knowledge which one got from such an examination of the stools should result in greater success in the future feeding of children.

DR. JOHN HOWLAND said that Dr. Morse had done them a real service in insisting upon an estimation of the caloric values of foods. That was the only satisfactory and accurate way to know the exact amount of food the child was taking. The impression seemed to prevail among some that these caloric methods told exactly what kind of food the child should take. This was not so. It simply told what amount of food was suitable for a child in order to satisfy his caloric requirements. It frequently happened that a child could not digest food in sufficient quantities to satisfy his caloric needs; in such cases the physician with his eyes wide open to the deficiency had to wait until the child's digestion improved. What was found more frequently, however, was that the caloric requirements of the child were exceeded. It very frequently happened that a diminution in the quantity of food was followed by very prompt relief of symptoms and a gain in the child's weight. Almost all the exact

chemical studies in metabolism that had been made in children had been made in infants; this, of course, was accounted for by the ease with which they could obtain the twenty-four hour specimens of feces and urine. Data upon the metabolism of children after the first year are very few and incomplete and exact data are very greatly needed. For this reason Dr. Howland regretted that Dr. Talbot had not continued in older children the really admirable investigations he had made upon infants.

DR. GODFREY R. PISEK believed that the contribution of Dr. Morse and Dr. Talbot would be of special value to the general practitioners. Such an examination of the stools could be made without a great deal of scientific knowledge, and such examinations certainly could be carried out in the home. Such microscopic examinations could be made at the home with but little effort. The microscope would often throw light upon causes of digestive disturbances. He believed that often there was a disturbance in the relation between the intestinal condition and the amount of food ingested. The study of the caloric value of the food acted as a check to the amount of food given.

DR. HERMAN SCHWARZ said he was very greatly interested in the paper that was presented by Dr. Morse and Dr. Talbot, for about two years ago, in trying to work up some diets for older children in a series of metabolism experiments that he was beginning, he found out how meagre was their data as to the normal figures. Calories and food elements necessary to keep children beyond the age of infancy in nitrogen equilibrium or make them gain were considered.

Dr. Schwarz believed that the reason this work had not been taken up more enthusiastically by the pediatricists was that the internists had not decided upon the value of Schmidt's work. The great difficulty had been with the fat indigestion. It is not easy to make a microscopic examination of the stools and judge of the fat digestion. Even the chemical analysis of the stools alone does not furnish us with absolute data, for some of the fat contained in the stools might have come from the walls of the intestines. Yet in spite of all this the method is one easily performed and apt to give us valuable clinical data. There are, though, a series of cases in which there is an indigestion without any change in the stools. A great point in the treatment of these cases was the question of rest. Digestion was greatly improved

often by simply placing the child on its back for an hour and a half every afternoon.

He had learned from his personal experience that milk was generally well borne and if not, as whole milk, then in the form of skimmed or diluted milk.

DR. ELIAS H. BARTLEY asked if it were possible, by means of a microscopic examination of the stools, to accurately estimate the quantity of fat. That was a very desirable addition to their knowledge. Often where he had been obliged to reduce the fat in the milk down to between 1 and 2 per cent. he had found that butter, if given with cereals or with bread or zwiebach, would be tolerated. The only interpretation he could give of this was that the cereal broke up the butter and made something like an emulsion in the stomach. He had one child under his care at present where he was obliged to keep the fat in the milk down to about 2 per cent. If more than that was given, it was evidenced by the putty character of the stools, an excess of mucus, excoriation of the nates, etc.

The statement had been made that it was an excess in the quantity of food that was the foundation of the digestive troubles rather than its quality. In general, all believed that when they gave a fairly-well balanced food, the question of quantity was very important. And here was where the heat value of the food came in. He said that he had adopted in his feeding, as a minimum for children under one year of age, 1 gram of protein for every pound of body weight per day. That meant the giving of about 1 ounce of milk for every pound of body weight per day. One could not always determine the particular amount of protein actually absorbed by any particular baby. To get the requirements of protein he thought they would be furnished by giving 1½ ounces of milk per pound weight of body per day. In practice this worked fairly well. But some children would not obey the rule as to caloric values when it came to fats. All these calculations for determining the caloric value of the food of infants must be modified to suit the baby under trial. These calculations are of value merely to check our feeding as to what the baby ought to have in its food to properly nourish it.

DR. FRITZ B. TALBOT, of Boston, said that in cases of starvation some fat is excreted and is found in the stools. Under normal conditions, the amount of fat excreted in the stools does not

increase when food containing fat is given. On this basis, he believes that the amount of fat seen under the microscope gives an estimate of the amount of fat in the stool. Normally, about 20 per cent. of the dry stool was composed of fat.

It is difficult, in making a microscopic examination of stools, to draw a definite dividing line and say what is normal and what is abnormal, when a specimen is near the border line. However, there is no difficulty in recognizing an absolutely normal or markedly pathologic stool. He has made a rule based on experience with the stools of older children, that when, with a No. 7 objective, he finds 6, 7 or 8 fat droplets in each field, and when, after the addition of glacial acetic acid and heat, nearly the whole preparation shows fat, he calls that an excess. But there is to be taken into account the individual equation in this as in other microscopic examinations.

In answer to Dr. Bartley's question as to how to determine or make an accurate estimate of the amount of fat in the stool, and how tell whether there is an excess of fat or not, he believes that the more practice one has the more proficient and accurate he becomes. Dr. Bartley mentioned 2 cases, one in which butter was digested only when given with a cereal, and another case in which there were acid stools after increasing the fat in the milk. He did not think this question was as simple as it appeared on the face of it. Herter and Kendall have shown in their bacteriologic work on stools that an excess of one component could change the bacteriologic flora; therefore, it was fair to assume that a predominance of certain types of bacterial flora might cause indigestion. It was a well-known fact that overfeeding of protein could cause fat indigestion, and he believed that overfeeding of fat could cause sugar indigestion. In the second instance, the increase of the fat, in the milk formula, may have caused sugar indigestion, and the products of sugar decomposition have caused the burning and irritated buttocks. Experience has shown that the microscopic examination of the stools is a very valuable aid in diagnosis and treatment, and Dr. Talbot said he had found that it was valuable in its negative results as well as in its positive. When he sees a youngster with some obscure dyspeptic upset and examines the stools and finds nothing abnormal, he feels that it is safe to say that some simple method of treatment will cure the indigestion.

DR. WILLIAM P. NORTHRUP expressed his appreciation of the

work done by Dr. Morse and Dr. Talbot. What had been presented to them tonight was another exact method of feeding infants and children determined by their needs. It seemed to Dr. Northrup to be a very valuable contribution. If one sees an indication of an excess of any one ingredient, it certainly furnishes a control. It furnished a point of departure which was destined to be very useful in the future.

DR. L. E. LA FÉTRA said that he was also convinced that a microscopic study of the stools would help to avoid certain errors which without it were not easy to discover. He agreed with Dr. Morse that the stools in carbohydrate indigestion frequently look like normal stools, being often brown and smooth. It is also quite common to discover that in feeding children who are losing weight the caloric value of the food is too high.

It had frequently been stated that the caloric method was a method of feeding. It is not a method of feeding. It is a method which merely tells us whether we are giving too much or too little food to the infant. It, therefore, serves as a measure for any method of feeding.

DR. MORSE, in concluding, said that he agreed entirely with Dr. Kerley that the prolonged use of milk was often the starting point of indigestion in infants, but he said he could hardly agree with him when he stated that milk was not well borne by older children with indigestion. In proper amounts milk usually did agree with them, although at times it was necessary to substitute skimmed milk for whole milk. In the vast majority of the cases of indigestion in children this condition could be easily straightened out by common sense methods of feeding, and such very careful treatment was not required. While this was true, he personally felt safer if he knew just what to do and why to do it. He found that, as a rule, he knew what the condition was from the macroscopic examination of the stools, but now and then Dr. Talbot surprised him very much by the result of his microscopic examination of the stools and prevented him from falling into serious error.

What Dr. Schwarz had said in regard to the importance of rest Dr. Morse agreed with. Rest was an important adjunct, not only in intestinal indigestion, but also in children who were run down from any cause.

THE PHILADELPHIA PEDIATRIC SOCIETY.

Meeting held December 14, 1909.

J. CLAXTON GITTINGS, M.D., PRESIDENT.

HYSTEROEPILEPSY ASSOCIATED WITH BOTHRIOCEPHALUS LATUS INFECTION.

DR. HOWARD CHILDS CARPENTER showed a girl eight years old with hysteroepilepsy and infected with the bothriocephalus latus. The child was born in Ireland, and was probably infected by eating uncooked pike. Links were first seen in the stools when she was three years old. For fifteen months she has been subject to general epileptiform convulsions, varying from one to fifteen convulsions a month; lately, in addition to these, she has had typical hysterical attacks. On four occasions long pieces of the worm have been passed, but as yet the head has not been obtained. Her blood shows a very moderate anemia.

DR. J. P. CROZER GRIFFITH said that although bothriocephalus latus is rare in this country, without doubt more cases occurred than were reported. He had himself seen one in a Swedish woman, several years ago, which he had not published. The patient showed the symptoms of pernicious anemia, such as the presence of this worm can readily occasion. It is to be noted that in the child exhibited to-night there is no marked anemia. Dr. Griffith thought that she was suffering from epilepsy, but that with it was combined a distinct element of hysteria.

EXTREME ENLARGEMENT OF LIVER AND SPLEEN.

DR. C. W. SCHAEFFER, by invitation, showed this case, in a girl eleven months old.

DR. ALFRED HAND, JR., said that physical examination was always very unsatisfactory in this patient; several conditions were suggested by the child's appearance, the first being tuberculosis, in view of the rigid abdominal walls and the positive von Pirquet reaction; but the tuberculosis may be elsewhere and the child is not yet greatly emaciated, so that syphilis was next thought of, and Dr. Hand advised the therapeutic test in spite of the negative Noguchi-Wassermann reaction. Other possibilities are general enlargement of liver and spleen secondary to some gastrointestinal

infection, analogous to von Jaksch's pseudoleukemic anemia, and lastly, neoplasm.

DR. GITTINGS had examined this child under anesthesia. The liver and spleen were greatly enlarged, firm and regular in outline, with rounded edges but without any suggestion of new growth. The lower right quadrant of the abdomen was tympanitic and ascites could not be demonstrated; neither could any masses be palpated. From all the evidence at hand the child had been unusually free from digestive disorders or any other illness and there were no signs of rachitis. The anemia is very mild and progresses very slowly. The clinical picture and previous history are, therefore, unlike those usually seen in so-called splenic anemia or in von Jaksch's anemia. In this connection it is interesting to note the cases of idiopathic splenic enlargement reported by Bovaird (*American Journal of Medical Sciences*, 1900) and others previously studied by the French, notably Bouchard; in these the enlargement was due to endothelial proliferation, but the marked coincident enlargement of the liver seen in Dr. Schaeffer's case was lacking. In regard to the question of syphilis, both the negative Noguchi test and the absence of all other corroborative signs are strong evidence against it. Nevertheless, he believes, with Dr. Hand, that mercurial treatment should be instituted. Further study of the blood will probably determine the diagnosis.

CONGENITAL HEART DISEASE.

DR. CHARLES A. FIFE showed this case, a boy aged three and a half years, because of the unusual degree of cyanosis, the excessive clubbing of fingers and toes, the peculiar shape of the heart, and the absence of a murmur which at one time was clearly heard. This child is the seventh of eight children, all the others reported normal, as are the parents. No other heart disease known in the family. No syphilis or tuberculosis. Birth was normal, though the mother was greatly underfed during pregnancy and lactation. The child seemed healthy until the tenth month when cyanosis of feet and hands were first noted. Cyanosis increased in intensity and was general on admission to the hospital six months ago, the skin being dusky, the mucous membrane dark purple. At that time clubbing of fingers and toes was as well marked as at present. The child is fairly intelligent, repeating words and sentences, but he does not often form sentences spontaneously. He makes no effort to stand or walk. The head is

large, overhanging, with greatest circumference $20\frac{1}{2}$ inches. Fontanelle is closed, but the depression is still very marked. Respirations average 30 per minute, but he frequently becomes very dyspneic, and on several occasions seemed to have anginoid attacks. There have been no convulsions. The pulse is very variable, but is usually about 110 per minute. Temperature is inclined to be subnormal, but is generally above normal in the afternoon. Urine examination is negative.

Blood count showed 7,410,000 reds and 7,120 whites on 6, 1, '09; 9,040,000 reds and 110 per cent. hemoglobin on 11, 28, '09; and 3,980,000 reds, 7,800 leukocytes and 115 per cent. hemoglobin on 12, 1, '09. Dr. T. B. Holloway reports the following examination of the eye grounds: "Cyanosis of conjunctiva, marked congestive appearance of each disc, giving it a dusky red appearance. Dilatation of smaller vessels about disc. Veins enormously dilated, tortuous and very dark, and where crossed by arteries they show distinct depressions. Arteries are also tortuous, but less so than the veins. No exudates or hemorrhages noted." In the last six months cyanosis has perhaps been a little less, but the skin still has a leaden hue, especially that of the face. The hands and feet are decidedly blue and the nails have a purple tint. The mucous membranes of the mouth are deep purple, becoming black when he cries. Crying at times causes epistaxis. Superficial veins are only moderately distended, but are most distinct over the temples, bridge of nose and upper part of chest. There is no edema. The heart area, on heavy percussion, gives right border $\frac{1}{4}$ inch to right of sternum; upper border second rib; extreme left border in midaxillary line $3\frac{1}{2}$ inches from midsternum; left border in second interspace $2\frac{3}{4}$ inches to left of midclavicular line. The impairment over first interspace extends one finger breadth to left of sternum. Apex beat rather diffuse but strongest impulse felt over body of heart. At present no murmurs can be detected. When examined last August, a very loud blowing murmur could be heard all over cardiac region, with maximum intensity in region of pulmonary artery. The right border of the heart was then thought to be at least $\frac{3}{4}$ inch to right of sternum.

Skiagraph shows very decided enlargement of left ventricle and auricle and a decided bulging above the auricle in region of ductus Botalli and pulmonary artery; no enlargement of right side of heart. The diagnosis is not positively made, but with his-

tory of previous murmur at base and with accentuated pulmonic second sound it is suggested that there is a wide defect in the interauricular septum, with stenosis of pulmonic artery and unduly patulous ductus arteriosus. It is believed that the right heart might not enlarge and might even atrophy if the opening in interauricular septum be large and if the intraventricular septum be practically complete. Transposition of vessels, with other combinations of anomalies is, however, not excluded.

DR. GRIFFITH said that the diagnosis in this case was certainly obscure, as was so likely to be in instances of congenital heart disease. Taking the symptoms as they exist at present, without reference to the previous history, the possibility of some anomalous origin of the large blood vessels was certainly to be entertained. It seemed hard to reconcile the absence of every trace of murmur with the combination of very decided pulmonary stenosis and of perforate septum ventriculorum and patulous ductus arteriosus, which must almost necessarily be present to enable the blood to escape from the right ventricle into the general and pulmonary circulation. The pulmonary stenosis by this age would very probably have developed some enlargement of the right side of the heart. The reason for the hypertrophy of the left side of the heart in this case is by no means clear.

DR. GITTINGS said that the blood count of 9,000,000 red cells was unusual. In a recent article on congenital heart disease (*British Medical Journal*, October 16, 1909) the highest erythrocyte count observed by George Carpenter was under 8,000,000.

INFECTIOUS PURPURA.

DR. C. J. HUNT read this paper by DR. SIDNEY J. REPPLIER. He reported a fatal case of purpura hemorrhagica closely following erysipelas. There were complete ecchymoses of both legs and the lower part of the abdomen, together with symptoms of cerebral hemorrhage. Autopsy was refused. He mentioned the recognition of the infectious character of purpura, but superficial search of the literature failed to disclose an instance following erysipelas.

PYELITIS SIMULATING APPENDICITIS.

DRS. J. F. SINCLAIR and J. H. JOPSON reported a case of acute pyelitis in a female child, eight years old, with symptoms suggestive of appendicitis. Examination of the urine and a diagnosis by exclusion led them to a definite and final diagnosis of pyelitis.

The leukocyte count varied from 12,000 to 18,600. The urine varied from 1.010 to 1.027 in specific gravity; was usually acid; showing traces of albumen, with pus, bacteria and white blood corpuscles. The symptoms elicited were fever, anorexia, headache, vomiting, pain in the right side of the abdomen, coated tongue, some rigidity of the right rectus muscle and pain and tenderness most marked between McBurney's point and the coated margin.

Dr. Jopson added that the question of diagnosis was of interest, as it was usually made by exclusion. This case resembled appendicitis, but was not typical; in fact, he believed it might be typhoid fever. Only after several days, after urine examinations, was the diagnosis made. The child made a perfect recovery.

DR. D. J. M. MILLER ventured to say that, had this case occurred ten or more years ago, the diagnosis would not have been made, as the urine of infants was not often examined then. Urinary examinations are more frequent now, and as a result we hear more of urinary infections in infancy. Dr. Miller makes a routine practice of examining the urine of every infant with unexplained fever. He also called attention to the remarkable way in which pyelitis, as in Dr. Jopson's case, will simulate other disease. He recalled a case of pyelitis with great anemia reported to this Society some years ago by Dr. H. C. Carpenter, in which the correct diagnosis was only made by examination of the urine. He also referred to a similar case of his own, in which the anemia was so extreme as to suggest this as the essential lesion, in which, through careless examination by a hospital interne, the urine was pronounced to be normal; at autopsy, however, multiple renal abscesses, with pyelitis, were found. Specimens from this case were also exhibited before this Society.

DR. GITTINGS said that although examinations of the urine are undoubtedly neglected in private practice, yet he believes that the many negative results of urine examinations in hospitals show the comparative rarity of pyelitis.

DR. H. C. CARPENTER said he had seen two fatal cases of chronic pyelitis in infants, one male, the other female. In both cases only a faint trace of albumin was present with some pus cells and the characteristic kidney pelvic cells. Both infants had intense secondary anemia; in each case the blood count showed less than 2,000,000 red cells.

CURRENT LITERATURE.

ABSTRACTS IN THIS NUMBER BY

DR. T. WOOD CLARKE.	DR. B. RAYMOND HOOBLER.
DR. R. S. HAYNES.	DR. M. NICOLL, JR.
DR. HENRY HEIMAN.	DR. M. C. PEASE, JR.
DR. ALFRED F. HESS.	DR. FRITZ B. TALBOT.
DR. S. W. THURBER.	

DISEASE OF THE EYE.

HALBERSTAEDTER, L. AND V. PROWAZEK, S.: CHLAMYDOZOA IN BLENNORRHEA NEONATORUM NONGONORRHOICA. (*Berlin. klin. Woch.*, October 11, 1909, p. 1,839.)

The title chlamydozoa has been given to the intracellular bodies found in trachoma. Various authors have said that these are not specific for trachoma, as they also occur in gonorrhea. Hence the present work. A series of cases of acute and chronic urethritis in the male and vaginitis in the female failed to show the bodies in the discharge or in scrapings. A series of gonorrheal ophthalmia neonatorum showing the gonococci also failed to show the granular bodies. On the other hand, 5 cases of blennorrhea neonatorum, clinically indistinguishable from the gonorrheal form, showed chlamydozoa in great numbers. Both smears and cultures failed to demonstrate gonococci in these cases. The chlamydozoa were also demonstrated in the vagina of the mother of one of these infants. From these findings it is evident that there is a nongonorrheal blennorrhea neonatorum, due to a parasite closely related to, and indistinguishable morphologically from, the trachoma bodies, both the trachoma and blennorrhea bodies being chlamydozoa.

T. WOOD CLARKE.

DISEASES OF THE EAR, NOSE AND THROAT.

BORDEN, CHARLES R. C.: AURAL COMPLICATIONS IN THE EXANTHEMATA. (*Annals of Otology, Rhinology and Laryngology*, September, 1909, p. 565.)

The author believes that measles, scarlet fever and diphtheria rank in order as producing aural complications. In measles and diphtheria the complications may come on during the acute symptoms, while in scarlet fever the middle ear is apt to be involved later in the disease. More mastoid complications are apt to occur in diphtheria than in the other two conditions, but the symp-

toms may be less typical. One peculiarity in the otitic infection of all these diseases is the lack of pain in the majority of cases. The most characteristic discharge is seen in measles and the thickest and scantiest discharge in diphtheria. Where the discharge is a brownish-white fluid with few pus cells, due to bone destruction, and the drum perforation is becoming larger, a mastoid operation should be done without delay in order to save the hearing. The author has obtained good results in performing adenectomy during the course of both measles and scarlet fever, but would council against it during the course of diphtheria. Sudden rise in temperature during the course of the exanthemata without apparent cause is usually due to aural involvement.

In conclusion, the following points are emphasized:—

(1) In scarlet fever, children are liable to middle ear inflammation, which may or may not involve the mastoid cells. Adults rarely have mastoiditis.

(2) In measles, both adults and children are very susceptible to middle ear involvement, and adults especially to mastoiditis.

(3) In cases where a profuse discharge is present for more than two or three weeks, the mastoid operation should be considered as a means of drainage.

(4) If after ruling out all other conditions by exclusion in difficult cases and the mastoid condition is doubtful, operate.

(5) In profuse nasal discharges following measles and scarlet fever, examine for adenoids and operate if they are found. This procedure is questionable in diphtheria.

(6) Aural discharge should be regarded as a menace to hearing, and occasionally to life, and not allowed to go untreated.

S. W. THURBER.

ANDERSON, WILLIS S.: NASAL OBSTRUCTION: EXPERIMENTAL STUDY OF ITS EFFECTS UPON THE RESPIRATORY ORGANS AND GENERAL SYSTEM. (*Annals of Otology, Rhinology and Laryngology*, September, 1909, p. 467.)

Though these experiments were carried out on guinea pigs, rabbits and dogs, in which the formation of the palate and epiglottis differs from the human anatomy and where, especially in the pigs and rabbits, nasal respiration appears to be essential to life, yet the results are instructive in comparing the observations made on children who have not used normal nasal respiration from birth. The nostrils of these animals were either closed by

cotton and collodion or sutured under ether-narcosis. Six tables are added to the article and show that no guinea pig with both nostrils closed lived more than six days; those with one nostril closed lived longer, two for eight months, but most of them died within one month; the life of the rabbits was shortened in the same way, and the cause of death in both these animals was due to two things, *i.e.*, infection due to lowered resistance and dilated heart.

The dogs showed a greater resistance for the reason that they were able to use the mouth more like the human animal, but they all suffered from general lack of nutrition, though supplied with an abundance of good food, as shown in loss of hair and wrinkling of the skin. Reopening of the nose was at once shown in a marked improvement and disappearance of symptoms. Asthma and emphysema were present in the animals experimented upon.

S. W. THURBER.

GIBB, JOSEPH S.: SOME OBSERVATIONS UPON THE COMPLETE EXTIRPATION OF THE DISEASED FAUCIAL TONSIL. (*Annals of Otology, Rhinology and Laryngology*, September, 1909, p. 578.)

This article is based on 100 cases in Girard College, of Philadelphia, where there was opportunity to observe the after effects of the operation and to contrast the condition previous to the operation with that following it. In a case of 102 applicants, 36 were found to have either adenoids or hypertrophied tonsils, or both. The cases selected for operation, as needing it, were: (1) Evident large tonsils, (2) buried tonsils covered by the pillars, and (3) those in which there was evidence of attacks of tonsillitis. Sixty-five were operated upon in one week, and were all under observation at one time. They were prepared as for a major operation. An anesthetic was given in all but a few of the older boys with nonadherent large tonsils.

The method of operating was to pull the tonsil well out and separate it from its bed by blunt dissection with the finger and metal separators, except in cases where the adhesions were very firm when sharp instruments were used, the main object in this stage being to cause as little traumatism as possible. After the tonsil has been separated it is taken off by the cold snare; in most cases this will remove it with capsule intact. The following reaction is either mild or severe; 90 per cent. of the cases had a temperature below 101°, and were those that had been easily

separated. In 9 the temperature ran above 102°, and were those whose tonsils had been repeatedly attacked by inflammation and in which much dissection had to be done. The local conditions after the operation were infiltration of the pillars and soft palate and a superficial slough on the tonsillar wound. There was, however, no disfigurement when healing has taken place. This operation is to be commended for its completeness and slight hemorrhage, which is always under control. S. W. THURBER.

ROSS, GEORGE T.: NASAL MYXOSARCOMA IN A CHILD OF THREE YEARS. (*Annals of Otology, Rhinology and Laryngology*, September, 1909, p. 562.)

This child, of French-Canadian parentage, had never been ill until six weeks before coming under observation for nasal obstruction. When first seen was in good condition except for slight anemia and had had frequent nose bleeds. Examination showed a yellowing mass entirely blocking the left naris. It was soft, covered with pus and bled on the slightest touch. Under general anesthesia it was removed with forceps, scissors and cautery and was found to be attached to the septum. It recurred in two weeks, but smaller, and was operated upon five times at intervals of two or three weeks, each time being smaller. The child was not brought back after the fifth operation.

Pathological diagnosis was myxosarcoma.

S. W. THURBER.

PATHOLOGY.

IKONNOFF, P.: PASSAGE OF BACTERIA THROUGH THE INTESTINAL WALL IN EXPERIMENTAL STRANGULATION. (*Annales de l'Institut Pasteur*, Vol. XXIII., No. 11, p. 921. From the laboratory of Prof. Metchnikoff.)

Ikonnoff concludes, as the result of his work on rabbits, that the passage of bacteria through the strangulated intestinal wall depends upon the phenomena of necrosis as well as the desquamation of epithelium which at times was so little in evidence that it was only demonstrated under the microscope. The time at which the bacteria appear in the intestinal wall depends upon the degree of strangulation, as well as the trouble of nutrition and necrotic lesions which it causes. The absence of bacteria in the peritoneal

cavity does not always indicate that they have not gone through the intestinal wall. Anaerobes, such as the bacillus perfringens and the bacillus paraputrificus, which digest albuminous matter, pass through the strangulated intestinal wall more easily than the bacterium coli and cocci. One only finds the latter after very marked necrosis of the tissue. If the epithelium remains intact the bacteria are carried to the mucosa by leukocytes.

FRTZ B. TALBOT.

TALBOT, FRITZ B.: CHEMICAL EXAMINATION OF THE FECES OF INFANTS AND CHILDREN AFTER GASTROENTEROSTOMY. (*Boston Medical and Surgical Journal*, November 25, 1909.)

The stools of 12 babies were examined chemically and microscopically at varying periods after gastroenterostomy had been done because of benign congenital pyloric stenosis. Clinically, all the children were doing "perfectly well." The microscopic tests for meat and starch were all negative in cases where those food components formed part of the diet. In the majority of instances the stools did not show an excess of nitrogen (which represents the protein) or an excess of fat. It seemed to the writer fair to conclude, therefore, that in most cases of benign pyloric stenosis in babies a gastroenterostomy does not materially change the digestion as shown by examination of the stools.

FRTZ B. TALBOT.

BRISCOE, J. CHARLTON: ON CERTAIN B. COLI INFECTIONS. (*The Lancet*, October 30, 1909, p. 1,271.)

B. coli infections of the urinary tract may cause no symptoms whatever according to this writer. In 6 out of 145 children examined, B. coli were found. In 2 of these cases symptoms were very slight; in 2 others there was a condition which might have been described as "febricula"; in the other 2 symptoms were quite severe. He refers to a case of postural albuminuria in which the patient suffers from intermittent attacks of headache and general malaise. During these attacks, which last from one to two days, many B. coli are present in the urine and the amount of albumin is greatly increased and is present on rising. He believes there is a direct relationship between the passage of bacilli, the quantity of albumin and the symptoms of malaise and headache.

B. RAYMOND HOOBLER.

HUTINEL: RENAL HEMORRHAGE IN CHILDREN. (*Le Pathologie Infantile*, February 15, 1909, p. 25.)

A concise statement as to the various factors which give rise to this condition.

M. NICOLL, JR.

THOMSEN, OLUF: WASSERMANN REACTION WITH MILK. (*Berlin. Klin. Woch.*, 1909, No. 46, p. 2,052.)

The milk of syphilitic women gives a strong Wassermann reaction during the first two to three days of lactation. If the mother nurses her child this reaction rapidly disappears and is lost by the sixth day. If she does not nurse the reaction remains as long as the milk. The milk during the last days of pregnancy also gives a positive reaction. The reaction in the milk may be positive, when in the blood it is negative. The milk of non-syphilitic mothers may also give a positive reaction but in a much less strength and never with less than 0.1 c.c. of milk. The value of these facts in diagnosis and prognosis can be proven only by further observations.

T. WOOD CLARKE.

LUST, F.: ANTIPROTEOLYTIC SUBSTANCE IN THE BLOOD SERUM OF HEALTHY AND ILL INFANTS. (*Münch. Med. Woch.*, October 5, 1909, p. 2,047.)

An increase in antiferment has been shown to indicate a destruction of body protein, especially in wasting disease. In the present study the antiferment of marasmic and other children is estimated by the casein digestion method of Fuld and Gross. Ten healthy infants showed an antiferment index the same as a normal adult irrespective of age. Twenty-two typical marasmic cases were studied, 21 giving a normal antiferment index, and 1 slightly raised. Nine of the cases classed by Finkelstein as "decomposition" cases also showed no variation from the normal. In all the cases of acute gastroenteritis and toxemia, however, the antiferment index was much increased. Of these cases, all of an index of 4.0 or above died and those below that recovered. This suggests the possibility of the test being of value in prognosis. The theoretical value of these findings are based upon the relation between increased antiferment and active proteolytic catabolism. They would suggest that in the chronic wasting infants there is little or no actual proteolytic tissue destruction, the loss being in the fat, whereas in acute toxic gastroenteritis protein destruction is rapid.

T. WOOD CLARKE.

PROSKAUER, F.: ACETONURIA IN SCARLET FEVER. (*Archiv. für Kinderhkk.*, Vol. I., p. 54.)

Acetone was found in the urine by the author in 100 cases of scarlet fever, at some time during the course of the disease. No change in the alkalinity of the blood could be demonstrated. The presence of acetone was apparently not dependent on the eruption; as it frequently was not present until several days after the appearance of the rash. The intensity of the fever had no apparent influence on the degree of acetonuria. Starvation was not a factor, as there was no relationship between the duration or degree of starvation and the presence of acetone. The author attributes the acetonuria not to a lack of carbohydrates in the food, but to an endogenous carbohydrate inanition, the result of toxic influences. Fat is then converted into sugar, and acetone is formed as a by-product.

HENRY HEIMAN.

REISS, E.: STUDIES IN THE CONCENTRATION OF THE BLOOD IN INFANCY. (*Jahrb. für Kinderhkk.*, September 1, 1909, p. 31.)

The determination of the concentration was made by means of the refractometer. Blood was obtained by a small incision in the big toe. Two small U-shaped tubes were filled with blood, then centrifugalized, and the serum examined with the refractometer. To obtain uniform results, the blood was always taken three hours after a feeding. Examinations were made every day or every other day and the body weight determined at the same time.

From the index of refraction, the albumin content of the blood could be approximately determined. This is not the same as the osmotic concentration, which is kept constant by a proportionate increase or decrease of water and soda salts, whereas the relative albumin content varies. The determination of the blood concentration by the refractometer is therefore of much greater value than that of the freezing point as determined by cryoscopy. The normal concentration in infants was found to vary between 5.6 and 6.6 per cent. The concentration in older children and adults varies between 7.5 and 9 per cent. This increased concentration takes place between six and ten months of life.

The simultaneous study of the body weight and blood concentration showed the following interesting and valuable results:

1. Body weight and concentration at constant levels. This is found in normal adults.

2. Increase in body-weight with unchanged blood concentration is the normal condition in a growing child.

3. Proportionate increase in body-weight and concentration is present in convalescence from exhausting diseases.

4. Proportionate decreases in body-weight and concentration is seen in cachexia, tuberculosis, and cancer.

5. Increase in body-weight, decrease in concentration means the retention of water in the body, and is seen in compensation of cardiac and renal diseases.

6. Decrease in weight, increase in concentration is the converse of 5, and indicates the loss of water.

7. Decrease in weight, unchanged concentration is present in the early stages of a diminishing edema. The edematous tissues here supply the water withdrawn from the blood.

8. Constant weight, decrease of concentration is due to simultaneous loss of tissues and retention of water. It is a condition present in severe cachexia.

9. Constant weight, increase of concentration is the converse of 8. There is a decrease in water, but the body-weight remains the same as a result of an increased tissue production.

In individual cases, important conclusions should not be drawn from the results of the blood concentration without due consideration of the general condition and the symptoms present.

In most of the cases of gastroenteritis, the author found an increased blood concentration, *i.e.*, a loss of water. In chronic gastroenteritis and infantile atrophy there was frequently no change in concentration. This would indicate that the theory that atrophy is due to non-assimilation of food from the intestinal tract is incorrect.

HENRY HEIMAN.

PHYSIOLOGY.

McDOUGAL: INVESTIGATION OF THE COLOR SENSE OF TWO INFANTS. (*British Journal of Psychology*, 1908, Vol. II., p. 338.)

The writer concluded from his experiments that the colors red, green and blue were appreciated by babies during the sixth month. He used modification of Baldwin's dynamogenic method.

FRITZ B. TALBOT.

SURGERY.

CAMERON, A. J.: A CASE OF CONGENITAL MALFORMATION OF THE ESOPHAGUS. (*Austral. Med. Gaz.*, March 20, 1909, p. 137.)

The infant attracted attention immediately after birth by its peculiar loud, hoarse cry, and by the large quantities of mucus brought up. It lived five days; all food, though taken eagerly, being regurgitated. A catheter passed down only four or five inches from the mouth. The temperature varied between 99° and 105° F. Postmortem examination showed the stomach coated with meconium, but containing no food. A catheter could be passed from the esophageal opening into the mouth, but from above downward met an obstruction at five inches. The upper part of the esophagus ended blindly at this point. It was dilated and united to the trachea at its lower end by fibrous tissue. The upper end of the lower portion opened into the trachea shortly above the bifurcation. From this point to the bifurcation of the trachea the anterior wall of the esophagus was either absent or fused with the posterior wall of the trachea. Below the bronchi the esophagus was normal.

M. NICOLL, JR.

PLEHN, A.: A FAMILY TYPE OF ENLARGEMENT OF THE SPLEEN AND LIVER WITH ANEMIA AND A FAVORABLE COURSE. (*Deutsch. med. Woch.*, October 7, 1909, p. 1,749.)

Schlagenhauser first described this condition in 1906. Six instances have been reported. In 2 the disease occurred singly; in 3 cases 2 in a family were affected, and once 4 members were ill. It is characterized by a very large spleen and liver with marked anemia and a good prognosis. The disease begins in early childhood and runs a long chronic course. Three cases are reported. The first, a girl of eighteen, had developed about as much as a child of fourteen. For years she had been very pale. The hemoglobin was 20 per cent. Mast-cells and nucleated red cells were seen. She was markedly jaundiced. The spleen filled the left abdomen; the liver was enlarged. During two years' observation she improved slightly. The second case, the father of the first, aged sixty-one; gave a history of a large spleen, anemia and jaundice as a child. He had, however, later served in the army and led an active life. He was pale and his spleen reached for one and one-half hand breadths below the ribs. The third case, a brother of the first, aged twenty-six, also had a large

spleen and pallor since childhood, but had never been ill. His hemoglobin was 48 per cent., and his spleen reached four finger breadths below the costal border. All the usual causes of splenic tumor, as syphilis, malaria, etc., could be ruled out in these cases.

T. WOOD CLARKE.

CANNON, W. B.: PHYSIOLOGICAL ASPECTS OF GASTROENTEROSTOMY. (*Boston Medical and Surgical Journal*, November 11, 1909.)

Cannon found that if the pylorus is patent, gastric contents will pass through the pylorus rather than through the anastomotic opening. If obstruction is present, food leaves the stomach through the artificial opening and, though the acid chyme doubtless causes a flow of pancreatic juice and bile, it may not receive proper admixture of these juices. As a consequence, a considerable amount of the fat and protein of the food may pass through the alimentary canal without being absorbed. This latter statement was based on two metabolism experiments of Joslin upon patients upon whom gastroenterostomy has been done.

FRITZ B. TALBOT.

SEEFISCH, G.: A LARGE CYST OF THE OMENTUM IN A CHILD OF FOUR. (*Deutsch. med. Woch.*, October 14, 1909, p. 1,790.)

The case is of a child of four, much emaciated with an enormous abdomen. The lungs and heart were normal and the glands not enlarged. The abdomen was flat in the flanks and tympanitic in the center; the dullness was movable. The temperature was normal and the pulse rapid. On the diagnosis of tuberculous peritonitis the abdomen was opened and a bluish-red cyst found, containing $2\frac{1}{2}$ to 3 liters of fluid. The pedicle was the size of a pencil and grew from the transverse colon. The walls consisted of juvenile omentum, fat, and connective tissue. The fluid contained blood, but no increase of leukocytes. The child recovered.

T. WOOD CLARKE.

ZANCARINI, GUISEPPE: TREATMENT OF FRACTURE OF THE THIGH IN THE NEWBORN. (*Münch. med. Woch.*, 1909, No. 46, p. 2,374.)

The obstetric fracture of the thigh occurs as a rule at the juncture of the upper and middle third. The best results in treat-

ment of this accident are obtained by using the infant's body as a splint. By flexing the limb over the abdomen and binding it by bandages around the trunk, the posterior deformity of the fragment is overcome. The foot by the side of the neck is held in extension by the clavicle. The bandage is removed daily to allow of massage. The results of this position is that there is no shortening of the limb and no deformity. As the posture is a reversion to the intrauterine position, it is well borne by the child and causes neither pain nor discomfort.

T. WOOD CLARKE.

HELBING, CARL: MY EXPERIENCE WITH 53 CLEFT PALATE OPERATIONS WITH TECHNICAL REPORT. (*Berlin. klin. Woch.*, September 27, 1909, p. 1,757.)

The advantages of early operation for cleft palate in preference to delay are as follows: The difficulties of the operation in very small children (of three months of age) are no greater, provided small instruments are used. On the contrary, the separation of the palate from the upper jaw is easier and is performed with less loss of blood. The chances of the stitches holding are as great, in the present series greater, in the younger children than in older ones. The danger to life is no greater, and, considering the great mortality among cleft palate cases during the first year, the danger of operation is less than that of procrastination. The functional results of early operation are much better than of late operation. The voice is often completely restored.

T. WOOD CLARKE.

DEISS, FRANZ: CAUSES OF PERITONITIS IN INFANCY. (*Centralb. für Kinderhk.*, March 1, 1909, p. 85.)

The writer calls attention to the frequency of peritonitis following appendicitis in young children. In the Children's Hospital at Basle, among 98 cases in children, 7 occurred in those under two years of age, and in 25 per cent. of those under five, the youngest being but two weeks old. A detailed history is given of a case of acute peritonitis in an infant a few hours old upon which a laparotomy was performed; the acute process being due to adhesions about the intestines, which caused rupture when they were distended by meconium and by water taken through the mouth. The adhesions probably were due to fetal peritonitis, the cause of which could not be determined.

M. NICOLL, JR.

MEDICINE.

HAMMOND, S. W.: INFECTIOUS DISEASES. (*Vermont Medical Monthly*, May 15, 1909, p. 109.)

Is there a decreasing virulence in the infectious diseases? The claim is generally made that there is, but, so far as can be ascertained, accompanied by no statistical proof or verification of any kind.

In ancient times smallpox, scarlet fever, measles and diphtheria epidemics were accompanied by a very high death rate; and the same may be said to-day of savage races. Possibly the amelioration of the severity of epidemics may be due to two general causes: First, those causes which lessen morbidity, such as vaccination in smallpox, and the increasing natural resistance of the human race to infection, or decrease in the virulence of bacteria and their toxins, or both. Secondly, such causes as antitoxin for diphtheria, earlier diagnosis, better methods of treatment, better nursing and better hygienic surroundings. The use of antitoxin as an immunizing agent, isolation, quarantine and what sanitary science has done to lessen the fevers, especially typhoid and yellow, cannot in a strict sense be said to lessen the severity of epidemics, although lessening mortality by their preventive influence.

M. C. PEASE, JR.

KRAUSE, PAUL: THE EPIDEMIC OF ANTERIOR POLEOMYELITIS IN WESTPHALIA. (*Deutsch. med. Woch.*, No. 42, 1909.)

The author, as the result of a careful study of over 400 cases, comes to the following conclusion: acute poliomyelitis is an infectious disease, as proved by its epidemic character, its occurrence among members of the same family, and by the fact that it is spread by personal contact. It occurs mainly in the second year of life, during the warm weather, and in congested districts. The portal of entry is not known. However, in 90 per cent. of the cases gastrointestinal symptoms preceded the attack, and in all of the eight autopsies performed, catarrhal changes in the small and large intestine were found, also enlargement of the spleen and of the mesenteric glands. The infectious virus is unknown, and there is no evidence of an intermediary host. However, both in Westphalia and in Sweden during the epidemic, a marked mortality among young chickens was noted.

ALFRED F. HESS.

SOUTHARD, E. E.: CONCLUSIONS FROM THE WORK ON THE DANVERS DYSENTERY EPIDEMIC OF 1908. (*Boston Medical and Surgical Journal*, November 11, 1909.)

The epidemic was due mainly to the Shiga bacillus dysenteriae. There was surprisingly early developments of agglutinins of some patients (even the first day of symptoms). These agglutinins, in some cases, persisted seven months. The blood picture places the disease logically with typhoid fever in respect to the absence of polynuclear leukocytosis. Some seven days of symptoms seem required for the production of intestinal ulceration. One hundred and fifty-six cases were studied, including 36 deaths.

FRITZ B. TALBOT.

CARR, WALTER LESTER: REMARKS BASED ON RECENT STUDIES OF DIARRHEAL DISEASES. (*American Journal of Obstetrics*, Vol. LX., No. 5, 1909.)

Carr reviews the recent literature on the subject. He points out that the majority of diarrheas are of bacillary origin; that there is an almost constant association of one of the group of dysentery bacilli (in America usually the Flexner bacillus) with all cases of diarrheas with mucus and blood; the bacilli persist in the intestines of convalescent patients, making them a source of danger to others. He outlines measures to be taken to prevent such infection. He shows that the serum treatment has been only partially successful because the sera hitherto available have been produced by the Shiga bacillus. He thinks that the leukocyte extract of Hiss and Zinsser may prove of value in these cases.

R. S. HAYNES.

MARTIN: OCCURRENCE OF REMISSIONS AND RECOVERY IN TUBERCULOUS MENINGITIS. (*Brain*, 1909, Vol. XXXII., p. 209.)

Conclusions drawn from a critical review of literature are that undoubtedly long remissions and even complete recovery do occur in tuberculous meningitis. Recoveries are possible more frequently than has been believed, since no fewer than 20 undoubted cases have been recorded since 1894, while other cases of recovery have been published in which the same definite proof of the nature of the disease has not been afforded, but some of which probably were true cases of tuberculous meningitis. In these cases the resistance of the individual is either so much greater than normal

that the disease is checked early in its course, or the virulence of the bacilli is so much less than usual that the lesion in the meninges becomes localized and later undergoes fibrous change. The lesions in the meninges may at a later period form the focus of a fresh infection which usually terminates fatally, and that consequently the prognosis in these cases must be guarded. No treatment up to the present has been discovered which has had any specific effect in promoting the favorable termination of the disease.

FRITZ B. TALBOT.

HECKER: THE EARLY DIAGNOSIS OF MEASLES. (*Münch. med. Woch.*, October 12, 1909, p. 2,102.)

The discovery of Koplik's spots made it possible to diagnose measles before the appearance of the rash, but not before the onset of the period of contagiousness. To obtain an actual prophylaxis in children's hospitals some sign is necessary which will enable a probable diagnosis in the early incubation period. A series of blood examinations shows that several days before the appearance of Koplik's spots there is a decrease in the leukocyte count, but with occasional transient hyperleukocytosis; in other words, marked daily variations. Especially noticeable is the decrease in the number of lymphocytes for several days before the onset of symptoms. This premonitory leukopenia and lymphopenia is a valuable sign of the incubation period of measles. It will be of little use in private practice, but may be applicable in a children's hospital where there is a suspicion of infection and early isolation is necessary.

T. WOOD CLARKE.

GALOIS, P.: HOW SHOULD SCARLET FEVER BE REGARDED? (*La Pathologie Infantile*, March 15, 1909, p. 49.)

The writer believes that scarlet fever should be looked on as a form of angina due to the streptococcus (whose variable types of morbidity are well recognized) with frequently, but not necessarily, a secondary eruption on the skin and mucous membrane. He cites cases where a typical scarlet fever rash communicated only a mild angina to those exposed, and, on the contrary, the latter condition caused typical symptoms of scarlet fever in another. In his opinion the affected mouth and nasopharynx are the sources of infection, and for this reason local treatment and disinfection should be rigorously employed as long as these parts

present any abnormality. Late developing nephritis may be caused by toxemia from the throat and nose, often not properly examined, and frequently neglected. Quarantine and diet should end when these parts are normal, whatever the condition of the skin.

M. NICOLL, JR.

TILESTON: DISSEMINATED MILIARY TUBERCULOSIS OF THE SKIN. AN IMPORTANT SIGN IN GENERAL MILIARY TUBERCULOSIS OF INFANCY. (*Archives of Internal Medicine*, July 15, 1909.)

Tileston describes a lesion of the skin which he believes is of great diagnostic importance in miliary tuberculosis. It "consists of scattered discrete papules, which at the beginning are the size of pinheads, and are soon capped by tiny vesicles with cloudy or purulent contents. Later on the vesicles ruptures or dries up and its place is taken by a crust. It is this stage which is most characteristic. The lesion is now 2 to 3 mm. in diameter, about the size of a rose spot in typical fever, and consists of a flat papule, only slightly elevated, of a dull red color, often glistening. The center is occupied by a crust, on the removal of which there is disclosed a sharply defined hollow, varying in size from the point to the head of a pin. Healing takes place if the child lives long enough, leaving a tiny white scar surrounded by a halo of brownish pigmentation." This eruption is seen sometimes in patients who do not give a tuberculin reaction; it indicates almost certainly a fatal outcome, and is due to a deposit of tubercle bacilli in the skin.

FRTZ B. TALBOT.

ALLAN, JOHN: THE IMPORTANCE OF THE EARLY RECOGNITION OF TUBERCULOUS MEDIASTINAL GLANDS IN CHILDREN. (*The Lancet*, October 23, 1909, p. 1,209.)

Dr. Allan points out that the most valuable local symptoms is the presence of a spasmodic cough, consisting of a number of sharp, short expiratory efforts followed by a long drawn inspiration, which is often mistaken for whooping-cough. Another diagnostic point is diminution of vocal fremitus due to constriction of a main bronchus. If glands are sufficiently large, dullness may be made out on percussion behind the manubrium sterni.

He believes Grancher's sign (permanent alteration of inspiration at one apex) to be unreliable. Enlarged mediastinal glands also give two other signs, viz., distention of veins of the neck

caused by pressure on the superior vena cava and a bruit which is heard in the veins when listened for over the manubrium sterni. This sound is best brought out when the child bends back its head.

He also suggests the use of the fluroscope and of the X-ray plate, by means of which the posterior mediastinum may be searched. This area in health is clear, but when the retrocardiac glands are enlarged the space remains dark.

B. RAYMOND HOOBLER.

MATHIESON, D. MORLEY: STREPTOCOCCAL INFECTION IN DIPHTHERIA; OBSERVATIONS IN 80 CONSECUTIVE CASES. (*The Lancet*, November 20, 1909, p. 1,493.)

Nine cases out of Dr. Mathieson's series of 80 showed marked streptococcal infection accompanying the Klebs-Löffler. In 5 of these 9 cases one or more of the typical "thirteenth days" symptoms developed. These symptoms first pointed out by Sevestre and Martin are: (1) A cutaneous eruption (most frequently scarlatiniform, but in a few cases a simple erythema); (2) joint pains; (3) albuminuria; and (4) general constitutional disturbances.

The connection of the above symptoms with streptococcus infection has previously been suggested by Sevestre and Martin, and by Roux and Dr. Mathieson's observations seem to bear out this connection.

B. RAYMOND HOOBLER.

THERAPEUTICS.

CZERNY, AD.: THE PROPHYLAXIS OF TUBERCULOSIS. (*Berlin. klin. Woch.*, 1909, No. 46, p. 2,045.)

The most important point in tuberculosis prophylaxis is education of the laity as to the contagiousness from man to man. In every case of tuberculosis in children the mode of infection should be determined in order to prevent further contagion. The parents of children infected, as well as tuberculous adults, must be told their condition, the danger of contagion, and the fact that it is a curable disease. The disease often masks itself in the guise of scrofula. People must be taught that every case of gland or bone tuberculosis may be a source of consumption. Not only must wet nurses be examined for the disease before being hired,

but all nursemaids also, as children may contract the disease from consumptive nurses. The general oversight of an entire family to prevent tuberculosis contagion is becoming annually more difficult as the family physician is disappearing, to be replaced by the specialist.

T. WOOD CLARKE.

LUCAS, WILLIAM P.: A REVIEW OF RECENT EXPERIMENTAL WORK ON HEMORRHAGIC CONDITIONS. (*Boston Medical and Surgical Journal*, November 18, 1909.)

Lucas gives a summary of the experimental work done up to date, and believes that calcium salts and gelatin do not affect the coagulation time of the blood and are, therefore, of no value in checking hemorrhages. Adrenalin given subcutaneously has only a temporary effect, which quickly wears off. It causes a rise in blood pressure, which in itself is not to be desired and might increase the hemorrhage. It has a styptic action when applied locally. Direct transfusion of blood is the most rational means of controlling the hemorrhage and for supplying the elements necessary for the actual increase in coagulability of the blood. Tests should be made beforehand, whenever this is done, to rule out the possibility that the donor's blood might cause hemolysis. This danger is minimized if the blood is taken from a member of the patient's family. The best substitute for human blood is fresh rabbit's serum. The writer treated 3 cases of purpura simplex, 2 cases of purpura hemorrhagica, 1 case of hemorrhage in the newborn, and 2 cases of congenital hemophilia in the Children's Hospital, Boston. The treatment of all these cases but one were successful. This patient died and showed at autopsy a secondary purpura due to acute miliary tuberculosis.

FRITZ B. TALBOT.

ROSENHAUPT, HEINRICH: RECTAL INJECTIONS OF SODIUM CHLORID AS A SPECIFIC TREATMENT FOR PYLOROSPASM OF INFANTS. (*Deutsch. med. Woch.*, October 14, 1909, p. 1,789.)

Many empirical methods of treating pylorospasm have been suggested. Engel recently showed that certain of the cases had marked hypersecretion of gastric juice which was the cause of the pylorospasm. The rational treatment of the disease is to prevent this hypersecretion. Heubner suggested atropin. The ideal therapeutic means would reduce the gastric secretion without

affecting other glands. Beczur's recent experiments on dogs suggests such a means. He found that by injecting sodium chlorid (4 per cent. solution) into the rectum, the secretion of gastric juice was much decreased. It has been the author's habit to inject saline per rectum in all cases of pylorospasm in order to keep up the body fluids. The remarkably favorable results obtained in these cases, there having been but one death in his series, may have been due to the specific action of the salt on the gastric secretion.

T. WOOD CLARKE.

DUNN, CHARLES HUNTER: THE TREATMENT OF SUMMER DIARRHEA AS INFLUENCED BY ETIOLOGY. (*Boston Medical and Surgical Journal*, November 18, 1909.)

Dunn uses the classification of summer diarrhea adopted by the Pediatric Department of the Harvard Medical School. This is divided into four groups. The initial treatment common to all is castor oil or calomel, boiled water and later barley water, followed by weak formulas. Further treatment varies with the type and is based on etiology:—

- (1) Acute nervous diarrhea: Paregoric in persistent cases.
- (2) Acute intestinal indigestion (irritative diarrhea; type of deficient secretion): Irrigation of long standing cases.
- (3) Acute intestinal indigestion (fermentation type, fermental diarrhea): Living lactic acid bacilli given in ripened fat-free milk or in buttermilk. Irrigation of colon in long standing cases.
- (4) Infectious diarrhea: Antidysenteric serum.

FRITZ B. TALBOT.

CUSHING, E. F.: PRECISION IN THE TREATMENT OF WHOOPING-COUGH. (*Cleveland Medical Journal*, November, 1909, p. 663.)

In treating whooping-cough one must contend with the lack of faith on the part of the parents as to the efficacy of therapeutic measures. Unusual exactness in the care of such cases is required. Early diagnosis is necessary. For this differential counting of the blood is of the greatest aid, as the lymphocytosis of pertussis is constant, and associated with a catarrhal cough is of the greatest diagnostic significance. A blood count should be as much a routine with a cough as a culture with a sore throat.

For the first few days the child should be in bed, and in the later stages of the disease, when the temperature is above 100°F., in which case the physician must be called at once. Fresh air is of the utmost importance, especially at night. The child must sleep with windows open or on a sleeping porch. The cold night air of winter is the best known sedative for the cough, while the preponderance of paroxysms at night is entirely due to the close atmosphere of the sleeping room. The patient should be confined to his own grounds, but may be allowed to drive but not motor. Laughter, romping and anger must be prevented as conducive to paroxysms. The latter must be charted with care, the record showing not only the number per day, but the exact hour at which each occurs. Vomiting is an important feature. The child must dine alone. The food should be given in small quantities frequently and the patient must lie down for an hour after meals. Kilmer's belt is of value. Belladonna, antipyrin, heroin, and opium are of value. Belladonna must be pushed to the physiological effect of flushing. The most important therapeutic measures are fresh air and precise details of the régime.

T. WOOD CLARKE.

INFANT FEEDING.

NOEGGERATH, C. T.: SEROLOGICAL STUDIES OF THE THEORY OF INFANT FEEDING. (*Deutsch. med. Woch.*, October 29, 1909, p. 1,872.)

As a result of the investigation of the colostrum and milk from 30 women, it has been found that while woman's milk may unquestionably contain a complement, that the latter is only a trace, and of irregular occurrence. In many cases no complement can be demonstrated during the entire period of lactation without this in any way interfering with the curative or nutritive properties of the milk. Complement was found in the colostrum in not a single instance. In the infant's serum also complement may appear, but not as a regular thing, and, in fact, not very commonly. The presence of complement in the serum of the infant has no relation to the characteristics of its food. These results are at variance with the statements made by Pfaundler.

T. WOOD CLARKE.

BOOK REVIEW.

COMMON DISORDERS AND DISEASES OF CHILDHOOD. By GEORGE FREDERICK STILL, M.A., M.D. (Contab), F.R.C.P. (London), Professor of Diseases of Children, King's College, London; Physician for Diseases of Children, King's College Hospital; Physician to Out-patients, Hospital for Sick Children, Great Ormond Street, Honorary Member of the American Pediatric Society. Pp. 731. London: Henry Frowde, Oxford University Press. Hodder & Stoughton. 1909.

Dr. Still's book is one of that class of medical works of which we cannot have too many. It is an expression of the author's personal experience and opinions, and acquires therefrom a peculiar unity and vigor. The title expresses admirably the contents, for the book does not aim to be an exhaustive treatise on children's diseases, but only to take up certain phases of most interest to the author. However, Dr. Still's interest is, as well as his experience, very wide and the scope of his book embraces a broad field.

Among the chapters of especial excellence are those on abdominal tuberculosis, rheumatism, heart disease in children, rheumatism pericarditis, chorea, and congenital heart disease, as might be expected from a writer of English experience. The chapters on abdominal pains, indigestion and constipation are good; that on bilious attacks, so-called, treats of a class of cases not yet sufficiently understood or differentiated and upon which much metabolism investigation remains to be done. The subject of infant feeding, ever a difficult one to teach from a text book, is perhaps less instructive than some others, but the handling of breast feeding and its limitations is sensible and adequate. Lastly, the chapter on hypertrophic stenosis of the pylorus is a classic, and probably nowhere, nor in so few words, can one find a better description.

The whole book presents the mature thought of a careful observer.

ACIDOSIS.—Ewing (*Archives of Internal Medicine*, December, 1908) gives a long and thorough discussion of the work that has been done on acidosis and associated conditions. . . . He summarizes his article as follows: (1) While all classes of foodstuffs yield acetone compounds in the test-tube, yet in the body these compounds are derived mainly from the fat tissues and to a less extent from the food. In diabetes, however, the proteins contribute directly or indirectly to the formation of acetone compounds. To what extent the proteins are drawn on in other conditions remains uncertain. (2) The complete combustion of fats requires the simultaneous katabolism of carbohydrates, in the absence of which there is a defective and possibly an abnormal course of fat combustion lodging in the acetone compounds. In all known conditions, even in diabetes, the metabolism of carbohydrates occupies a controlling position in this form of acidosis. (3) Oxidation of straight-chain fatty acids occurs at the beta-carbon atom, so that such acids with an even number and at least four carbon atoms may yield beta-oxybutyric acid. Oxidation of pure fatty acids in the test-tube may occur at the alpha carbon atom, with avoidance of acetone compounds, but whether this course may be followed in metabolism is uncertain. From branched fatty acids a methyl group may be replaced by hydroxyl, and in amido acids oxidation occurs at any carbon atom holding an amido group, both of which processes may yield beta-oxybutyric acid. Knopp's work and the ready destruction of oxybutyric acid in healthy men indicate that this acid is a normal product of metabolism. (4) The urinary ammonia is influenced by the total nitrogen excretion, by the presence of fatty acid derivatives, by lactic acid, possibly by inorganic acids, and notably by defective synthetic functions of the liver. It bears rather loose relation to the acetone compounds, and, being an indirect measure of the presence of acids, cannot replace their direct estimation. (5) The grounds are still inadequate to support the view that acetone compounds, as they arise in the body, exert any notable direct toxic action. (6) Oxidation and hydrolysis are both concerned in the formation of acetone compounds. (7) Lactic acid is a product of disordered or defective katabolism, chiefly of glycogen; it results also from disturbed function of the liver and bears an important relation to fatty degeneration.—*Boston Medical and Surgical Journal*.

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ORIGINAL COMMUNICATIONS.

THE MEDICAL WORK OF THE JUVENILE COURT OF COOK COUNTY, CHICAGO, ILL.*

BY FRANK SPOONER CHURCHILL, M.D.,

Consulting Physician to the Court,

AND

JAMES A. BRITTON, M.D.,

Attending Physician to the Court.

The Juvenile Court is an institution established to care for the dependent and neglected children of the state and to furnish the legal machinery for the separate trial and correction of youthful transgressors of the law. As an institution it is of comparatively recent origin. True, as long ago as 1736, Massachusetts passed a law intended to provide special care for dependent and neglected children. Subsequently various statutes were enacted in different colonies and states having the same general object in view. The most important of these was a law enacted by Massachusetts in 1863, providing for the separation of child and

* Read before the Twenty-first Annual Meeting of the American Pediatric Society, Lenox, Mass., May 28, 1909.

adult criminals, and similar laws passed by New York in 1877 and 1884.

The first effective step toward the solution of these problems of the child, however, was taken by Illinois in 1899, when that state enacted the first real juvenile court law. This law was entitled "An Act to Regulate the Treatment and Control of Dependent, Neglected and Delinquent Children," contained a comprehensive definition of such children and conferred on special courts original jurisdiction concerning them. The intention and spirit of the law is that the state shall act the part of a wise and solicitous parent toward its unfortunate children who become dependent or delinquent. In accordance with this law the present Juvenile Court of Cook County (Chicago) was established about ten years ago and immediately found too abundant opportunity for the exercise of its functions. Its work and sphere of usefulness have steadily increased until now it consists of a complex but effective machinery of judges, clerks, probation officers, social workers, visiting nurses, a "Court Physician" and a "Court Nurse," all working toward the common goal of giving proper care to these unfortunate children and seeking to strike at the root of the causes and conditions producing their dependency and delinquency.

It became evident to the workers in the Juvenile Court, after a few years, that considerable numbers of the children brought before the Court were physically defective in one or more respects and that there was need of physical, fully as much as of moral, correction. For example, a child is brought before the court, having committed some petty offence. It is found on enquiry that he *used* to go to school, but was apparently deaf or could not see well, consequently did poorly in his school work, fell behind, became discouraged, was allowed by ignorant, perhaps dissipated, parents to drop out of school and to run the streets with the inevitably mischievous result. Physical examination at the Court shows the presence of large tonsils or adenoids, or markedly defective vision due to hypermetropia or astigmatism. Correction of these defects transforms the "delinquent" into a docile child, eventually willing to return to school, there to do effective work.

The county officials, in view of these facts and acting upon the suggestions of the Court workers, decided to establish systematic examinations of these children and asked one of us

(F. S. C.), as Secretary of the Children's Hospital Society, to take charge of and organize this branch of the Court work. This was done in the fall of 1907, and a staff of general physicians, specialists and trained nurses was organized, and for some time supported by private contributions. Early in this year, 1909, the positions of "Court Physician" and "Court Nurse" were officially created and filled by competitive civil service examination. The position of "Court Physician" is now held by one of us (J. A. B.).

The Court now demands that each child brought before it shall first have a physical examination made by the "Court Physician," and that the recommendations of the latter shall be written out and presented, together with the child and his other papers. These recommendations are given due weight by the judge in his final disposition of the case.

The method of procedure in the physical examination is as follows: The age, sex and nationality of each child are noted; then a physical examination is made, special attention being paid to the following points: weight, height, girth of chest, vision, hearing, tonsils, adenoids, teeth, condition of lungs, heart and skin; presence or absence of venereal disease. The object of the examination is twofold: First, to determine the immediate condition of the child in order to make the proper recommendations to the Court; and, second, to determine, by study of large numbers of children, what, if any, relation exists between their physical condition and their delinquency. It is with this aspect of the problem that this paper deals.

The total number of children studied is 2,758—1,208 "dependents," 1,550 "delinquents." A "dependent" child is one with no, or ineffectual, home care, one whose home does not "functionate" properly. A "delinquent" child is one who has transgressed the law in some way or other. The former group comprise the children from three to eleven years inclusive, the latter group from twelve to sixteen years inclusive. There are, however, a few "delinquents" among the nine to twelve year olds. The total number of boys is 2,271; of girls, 487. They are divided among the two groups as follows:—

	Dependents.	Delinquents.
Boys	862	1,409
Girls	346	141

The great preponderance of boys among the delinquents is striking.

TABLE I.—NATIONALITIES.

	1,204	1,550
	Dependents.	Delinquents.
Americans (white)	31 per cent.	27 per cent.
German	15 " "	16 " "
Polish	13 " "	14 " "
Irish	12 " "	9 " "
Italian	6 " "	7 " "
Americans (colored)	5 " "	6 " "
Bohemian	4 " "	5 " "
Jews	4 " "	6 " "
—	—	—
	90 per cent.	88 per cent.

Nationality.—The number of nationalities represented is manifold, as we should expect when we recall that 77 per cent. of the children in the Chicago public schools are of foreign-born parentage. A table shows in percentages the relative proportion of the different peoples. Among the dependents 90 per cent. are made up of Americans, Germans, Polish, Italians, Bohemians and Jewish, in the order named, and among the delinquents 95 per cent. are made up from the same peoples plus a few from the Swedes, Norwegians and French. The remainder in both groups is made up from the English, Dutch, Lithuanians, Scotch, Danish, Hungarians, Slavs, Canadians, Indians, Austrians, Welsh, Flemish, Swiss and Greeks, less than 1 per cent. from each nationality.

The preponderance of Americans is striking, but this preponderance is only apparent. The term "American" is misleading and includes all children born in this country whose parentage could not be determined with certainty. The great majority so classed are in reality of foreign-born parentage and properly belong among other peoples. The number of pure Americans is exceedingly small. The comparatively high proportion of German (16 per cent.), Polish (14 per cent.), and Irish (12 per cent.) children is undoubtedly due to the large number of these peoples in Chicago. The school census of 1908 gives the following figures as to their numbers: Germans, 421,615; Polish, 129,733;

Irish, 179,845. The actual number of children from these various nationalities brought into the Juvenile Court, and the proportion of such children to their totals in the city, may then be tabulated as follows:—

TABLE II.

Total German	Dependents, 180, or 1:2,340	of total German population.		
"	"	Delinquents, 248, or 1:1,700	"	"
Total Polish	Dependents, 156, or 1:831	"	Polish	"
"	"	Delinquents, 217, or 1:598	"	"
Total Irish	Dependents, 144, or 1:1,248	"	Irish	"
"	"	Delinquents, 139, or 1:1,294	"	"

Thus, the Polish people, in proportion to their total number in the city, contribute the largest number of children to the Juvenile Court work. But the number of children from each nationality brought into Court is not dependent upon mere totals alone; thus the Swedes, who come numerically next to the above three nationalities, from a total population of 107,280, contribute not a single child to the dependent group, and furnish to the delinquent group but 31 children (2 per cent.), or 1:3,461 of the total population. Other factors than numbers enter into the problem, but what part national habits, home training, religious instruction, etc., play in the problem it is not the purpose of this paper to discuss.

Height, Weight and Chest Capacity.—The height, weight and chest capacity of individuals give a fairly correct idea of their physical vigor. Observations upon these characteristics have, therefore, been made upon the Court children, the results tabulated and averaged according to age and curves plotted upon these averages. For purposes of comparison we have introduced into the charts, curves based upon similar averages obtained by Bowditch twenty years ago, studying Boston school children of American parentage.

A.—Boys.—During the first two or three years there is but little difference in physique between the Court boys and the normal, but at four or five years their poor food and unhygienic surroundings begin to make themselves felt and they fall off in weight and chest capacity. They continue slightly taller, however, until about the eighth year, when there is a sharp falling off in their rate of growth, and from this age upward they are shorter than normal. This is undoubtedly due to the fact that at about

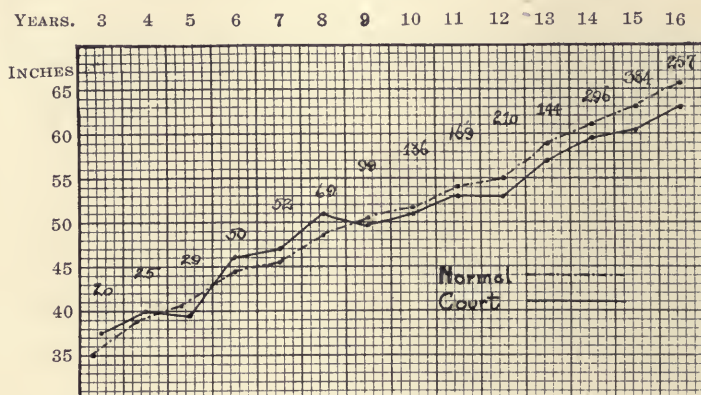


FIG. 1. CHART SHOWING HEIGHT OF BOYS.

eight years many of these little fellows begin outside work, besides school, getting up at four or five o'clock in the morning to buy and sell papers, and also working evenings.

A.—Girls.—The Court girls from the start are slightly be-

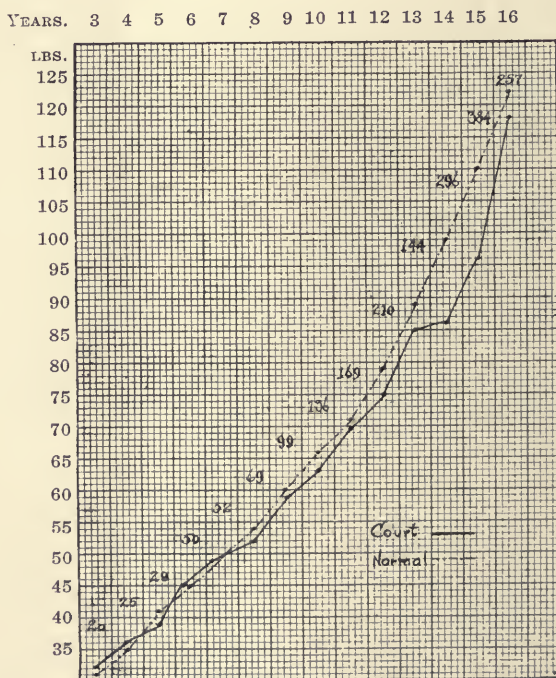


FIG. 2. CHART SHOWING WEIGHT OF BOYS.

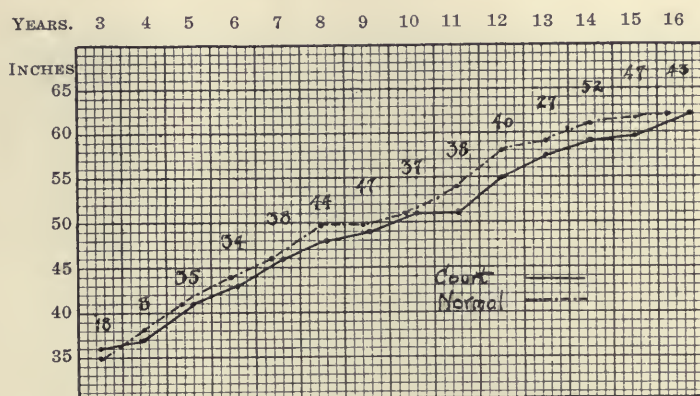


FIG. 3. CHART SHOWING HEIGHT OF GIRLS.

low normal in height and weight, though apparently of greater chest capacity at first. They continue below in all respects until the sixteenth year, when we see a sharp rise in the weight curve, and we find these girls 10 pounds heavier than normal, and of

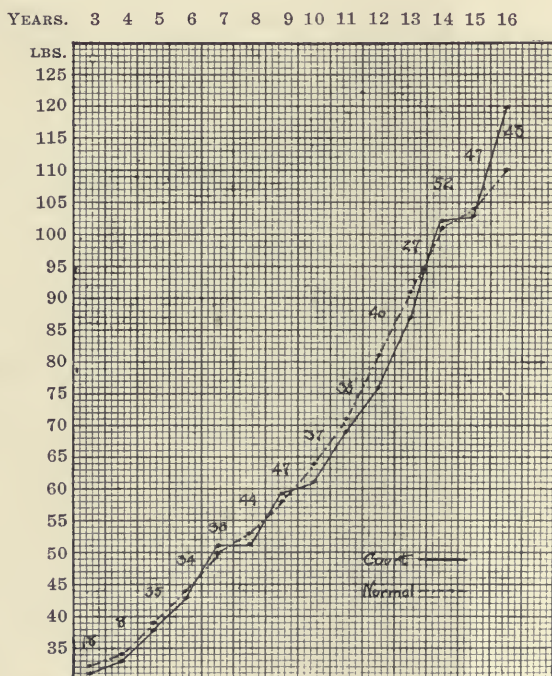


FIG. 4. CHART SHOWING WEIGHT OF GIRLS.

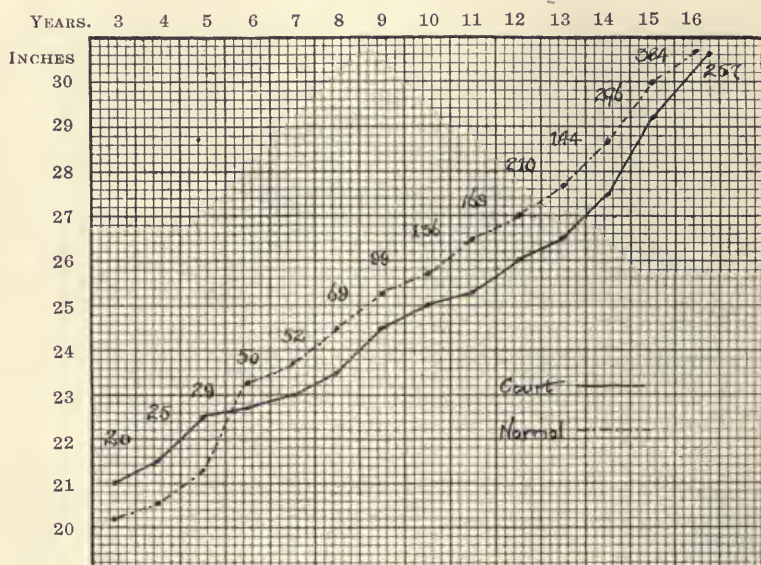


FIG. 5. CHART SHOWING CHEST CIRCUMFERENCE IN BOYS.

equal height. At this age they are all in the delinquent group, are of large, well-developed form and physique, characteristics which render them attractive and lead to their delinquency.

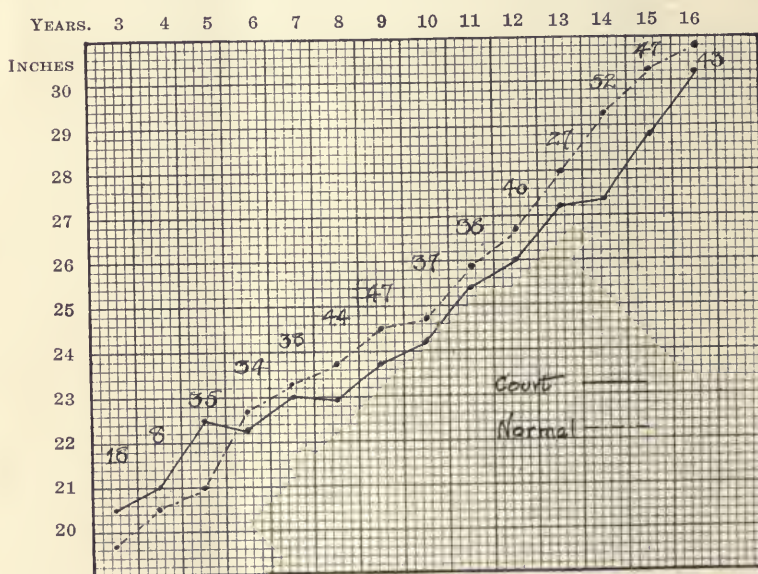


FIG. 6. CHART SHOWING CHEST CIRCUMFERENCE IN GIRLS.

We now come to a consideration of the abnormalities of physique in these children, studied and tabulated according to group. The table shows the proportion of the various abnormalities on the part of the different organs in both groups. The striking data are: the high percentages of carious teeth, of enlarged tonsils, especially among the delinquents, of enlarged cervical glands, of defective eyes, the large number of ear affections and the frequency of gonococcus disease. The discrepancy between the number of tonsils (45 per cent.) and adenoids (3 per cent.) is due perhaps to lack of more systematic examination for the latter. They are found in this series in only about $\frac{1}{14}$ of the cases with hypertrophied tonsils, whereas, as a general rule, adenoids are found in about $\frac{1}{3}$ of the cases having hypertrophied tonsils.

The small number of pulmonary affections (4 per cent.) is rather striking, when we consider the surroundings of these children; only 5 cases of pulmonary tuberculosis were detected in the whole series. It is not improbable, however, that some of the children with enlarged cervical glands had tuberculosis of the lymphatic system; no tuberculin tests have been made.

There is a comparatively high percentage of ear troubles (45 per cent.); they were mostly cases of chronic otitis media, with a more or less intermittent discharge and were more frequent among the older children. There is possibly some connection between this frequency of ear troubles and the large number of hypertrophied tonsils.

TABLE III.

	I,204	I,550
	Dependents.	Delinquents.
Adenoids	4 per cent.	3 per cent.
Hypertrophied tonsils	39 " "	45 " "
Cervical glands	24 " "	17 " "
Thyroid	3 " "	45 " "
Ear	8 " "	25 " "
Teeth	60 " "	68 " "
Lungs	4 " "	3 " "
Skin	4 " "	2 " "
Heart	4 " "	3 " "
Eye		17 " "
Gonococcus		35 " "

Eye defects were serious enough to require glasses in 17 per cent. of the cases, and it is not at all improbable that in the children presenting this condition of the eyes the defect may have been a considerable factor in the development of delinquency in the manner already outlined—difficulty at school, dropping out, the street, mischief, juvenile court.

The condition of the teeth, as in all dispensary patients, is most lamentable. The statement in percentages hardly gives a correct idea of the extent of this trouble, inasmuch as every child included in the record had from 2 to 12 carious teeth. The tooth-brush is a practically unknown weapon of civilization among these people, and the "tooth-brush" drill, now practiced in certain Chicago schools, should be heartily encouraged.

The Gonococcus.—Gonococcus infections are limited almost exclusively to the girls; but among them it is very frequent, 35 per cent., or more than one-third of the girls, having a gonococcus vaginitis. They were all, with but few exceptions, among the delinquents. Some had a vaginal discharge, more did not. A bacteriologic examination of the vagina is made on every girl who goes into the Court Home, where the children are kept pending their respective cases. By means of this routine bacteriologic examination not a few cases of gonococcus disease are discovered which would otherwise escape detection. The same practice is pursued with all our girl patients at the Cook County Hospital with similar results.

The absence of syphilis is somewhat surprising, only 1 case among the delinquents, and that in a fifteen-year-old boy. It is possible that cases of obscure, late, congenital syphilis among the dependents have been overlooked, but there were no self-evident cases.

The almost entire absence of acute disease, contagious and noncontagious, is due simply to the fact that we have instructed probation officers that, on no account, are they to bring a sick child to the Court Dispensary; if he be sick at the time set for his hearing the case is postponed. Rigid enforcement of this rule has undoubtedly done much to prevent the spread of disease from this particular center as a focus.

These two groups of children, taken as a whole, must be regarded as remarkably free from serious organic disease, considering their environment—air, food, lack of cleanliness. We find practically no cerebral or nervous disease, remarkably little

pulmonary or cardiac disease, practically no serious digestive disturbances. The most frequent departures from the normal appear to be on the part of the teeth, tonsils, ears and eyes. All the defects in these directions are remediable, and in all instances recommendations in this direction are made, and whenever possible the children are followed up until the recommendations have been carried out. This has been possible in many cases through the coöperation of judge, probation officers, and especially of visiting nurses, the latter following the children into the homes when they are returned to the home, or into the various institutions to which they are assigned.

The frequency of gonococcus disease among the older girls is but an index of the extent to which this infection prevails among this class of the community in every large city. It is a result, not a cause, of delinquency. That it is on the increase in our large cities there can be but little doubt, and it has already reached such proportions as to demand the attention of public officials. The Chicago Health Department has already taken measures to have cases of this contagious disease reported as the first step toward its attempted control. Physicians on the staffs of children's hospitals, of orphan asylums, etc., should coöperate in every way, especially by regular, routine bacteriologic examination of the vagina in all their female patients.

SUMMARY.

The main points in this paper may be summarized briefly as follows:—

The children brought before the Chicago Juvenile Court, in the early years of their dependency, differ little in their physique from children living under more favorable conditions. The boys, as a rule, are taller, but less well nourished and of smaller chest capacity. The girls are inferior in height, weight and chest capacity. The boys, in the latter half of their dependency, *e.g.*, nine to twelve years, and throughout their delinquency, are inferior in all respects, and their inferiority is more marked after the age of puberty. The same comment holds true for the girls during these same periods, until they reach sixteen, when they are equally as tall as, and far heavier than, their more fortunately surrounded mates, which superiority in physique, by its very attractiveness, is one of the main factors in causing their delinquency.

All the children of both groups are remarkably free from organic disease.

Considerable numbers present drawbacks to perfect physical health in the shape of enlarged tonsils, and probably adenoids, carious teeth, enlarged cervical glands and diseases of the ear. A small proportion, about $\frac{1}{8}$, have trouble with the eyes. This defective vision and the deafness resulting from enlarged tonsils, adenoid growths and ear disease, are defects more or less predisposing to delinquency by rendering school work more difficult, and the street life, with its attendant evils, more easy and attractive.

The frequency of gonococcus disease among the older girls is merely an index of the prevalence of this infection among this particular class as a whole.

The generally lowered tone of the delinquents, as manifested by diminished height, weight and chest capacity, probably plays no part in the production of delinquency, but is rather a result of the general life led by these children, the result of common causes leading also to mischievous, delinquent conduct, viz.: bad air, poor food, bad surroundings, smoking, drinking, etc., etc.

Four thousand of these children are annually brought before the Juvenile Court of Chicago. Presumably, Chicago is no exception to the other large cities of the country. The children themselves merit whatever help can be rendered them. That their presence in such large numbers in the various centers of our country constitutes a focus of danger to the future welfare of the country, affecting seriously as it does the growing generation, there can be no doubt. They constitute a problem well worthy the serious study of all workers among children, settlement workers, nurses and pediatricians.

Our thanks are due to Miss Bena M. Henderson, Superintendent of the Children's Hospital Society, and to Miss Margaret Little, the official "Court Nurse," for much valuable help in the preparation of this paper.

Chicago, May, 1909.

EXPERIMENTAL EPIDEMIC POLIOMYELITIS.*

BY SIMON FLEXNER, M.D.,

AND

PAUL A. LEWIS, M.D.,

New York.

(*From the Laboratories of the Rockefeller Institute for Medical Research, New York.*)

Poliomyelitis or infantile paralysis has prevailed in epidemic form, in the late summer and autumn months, in some parts of the United States, since 1907. The epidemic first appeared, apparently, along the Atlantic Seaboard in 1907, and then spread slowly westward. In 1909 it prevailed severely in some of the Middle Western States (notably in Minnesota), in the Eastern States and in Eastern Canada. Concomitantly an epidemic appeared in Austria and Germany and, late in the year, in France.

Until very recently the cause of the disease was unknown, and even now its mode of dissemination has not been discovered. There does not exist, therefore, any intelligent means of prevention. While the severity and fatality of the disease in different epidemics fluctuate widely, its effects are always so disastrous as to make it of the highest medical and social importance.

The knowledge of the nature of epidemic poliomyelitis has been immeasurably advanced by the opportunity for experimental study opened up by the successful transmission of the disease to lower animals.

In May, 1909, Landsteiner and Popper† published a report of two successful inoculations of monkeys with the spinal cord obtained from 2 fatal cases of poliomyelitis. The injections were made into the peritoneal cavity. One monkey became paralyzed in the lower extremities and died on the sixth day after inoculation; the other was killed on the nineteenth day. In both, lesions of the spinal cord similar to those in man existed. The disease could not be transferred to other monkeys. Our efforts to transmit the disease to lower animals were first made in 1907, at which time cerebrospinal fluid obtained by lumbar puncture was introduced into the spinal canal and peritoneal cavity in monkeys and other animals. We were limited to this fluid, as we did not secure material from a fatal case. The results were negative. Since September of last year we have secured suitable material from

* This account is based on the four notes published by us in *The Journal of the American Medical Association*, *The Journal of the American Medical Association*, November 13, 1909, Vol. LIII., p. 1,639; December 4, 1909, Vol. LIII., p. 1,913; December 18, 1909, Vol. LIII., p. 2,095; January 1, 1910, Vol. LIV., p. 45.

† Landsteiner and Popper; *Ztschr. f. Immunitätsforsch., Orig.*, 1909, Vol. II., p. 377.

2 cases of poliomyelitis in human beings. For the material for one we are indebted to Dr. Ridner, of Lake Hopatcong, N. J., and for the other to Dr. Le Grand Kerr, of Brooklyn.

Dr. Ridner's patient died on the fifth or sixth day after the appearance of the paralysis, which affected the lower extremities. The lumbar cord was obtained in a sterile condition twenty-six hours after death, and a portion was inoculated into monkeys about twelve hours later. The entire spinal cord was obtained from Dr. Kerr's case twelve hours after death, and inoculation into monkeys was made four hours later. In Dr. Kerr's case, in which death occurred on the fourth day, the lesions were diffuse throughout the cord. Paralysis had been very extensive. The gross and microscopic lesions were characteristic in both cases.

In order to favor the transmission of the disease to monkeys, the brain was chosen as the site of inoculation, which was made under ether anesthesia through a small trephine opening. After the operation, the animals were at once lively and normal. The injected material consisted at first of emulsions in salt solution of the spinal cord from the children and later of emulsions of spinal cord of monkeys developing the paralysis. We may mention here that the microscopic study of the spinal cord from the affected monkeys has shown, without exceptions, lesions similar to those of poliomyelitis in man. In some cases the lesions in the cords of monkeys could be detected by the naked eye.

Up to the present time the two viruses have been carried successfully through eight series of monkeys, and it is regarded as highly probable that the transmission may be carried on indefinitely. Moreover, not only is the spinal cord active, but the cortex of the brain is also, and, as will appear, still other organs may harbor the active virus.

Not all monkeys develop the disease and show paralysis even when the inoculation of the virus is made into the brain. A delayed or unsuccessful inoculation with one virus may be converted into a successful infection by reinoculation with another and, apparently, more active virus.

The degree of success which has attended the experimental production of poliomyelitis justifies us in affirming that the virus of poliomyelitis cannot be very difficult of transmission to monkeys under the conditions leading to the development of the lesions and symptoms characteristic of epidemic poliomyelitis in man, since both specimens of spinal cord, furnishing the original

virus, have sufficed for the transmission of the disease successively.

It can now be stated definitely that it is not absolutely essential that the virus be introduced into the brain, but that successive transmission is possible by way of the peritoneal cavity, by intravascular injection, by subcutaneous injection, and by intraneural injection. The lesions in the monkey in which the virus was introduced into the sheath of the sciatic nerve developed first on the side inoculated and later extended to the opposite side of the spinal cord. On the other hand, it cannot yet be affirmed that still other avenues do not exist for the entrance of the virus into the central nervous system. Additional observations are required before the statement can be ventured that infection may not occur by way of the skin, the respiratory passages and the digestive tract. At the moment it would appear, from certain tests made by us, that it is more difficult to effect infection through these channels.

It is entirely clear, however, that no matter which avenue of infection is traversed by the virus, it becomes established in the spinal cord and medulla, where it sets up characteristic lesions which are followed by equally characteristic effects that exhibit themselves as the usual symptoms of infantile paralysis in human beings. Not all monkeys which develop paralysis succumb to the disease, but a certain number recover in large measure from the paralysis. When recovery does take place there tend to remain, however, residues of paralysis which resemble the paralytic effects also persisting in human subjects of poliomyelitis.

From the beginning our attention has been directed toward the discovery of the nature of the virus responsible for producing poliomyelitis, but the results of our studies were, until recently, wholly of a negative nature. We failed utterly to discover bacteria, either in film preparations or in cultures, that could account for the disease; and, since among our long series of propagations of the virus in monkeys not one animal showed, in the lesions, the cocci described by some previous investigators and we had failed to obtain any such bacteria from the human material studied by us, we felt that they could be excluded from consideration.

We have, up to this time, made a very painstaking study of film preparations and sections prepared from two specimens of human spinal cord and many specimens of the spinal cord and brain (and other viscera) obtained from monkeys, prepared and stained in the most various ways, but without finding either bac-

terial or protozoal parasites that could account for the infection.

The readiness with which epidemic poliomyelitis can be transmitted to monkeys and the failure to find visible and stainable parasites in the lesions of the spontaneous and experimental disease led to another line of investigation. It is known, for example, that the viruses of vaccinia and rabies, neither of which has been certainly demonstrated in films or sections of tissues or cultivated artificially, withstand very well the action of the glycerin, while bacteria withstand it far less well. The bacteria mechanically admixed with the virus of vaccinia can be destroyed by glycerination.

We have, therefore, suspended the comminuted spinal cords of monkeys affected with poliomyelitis in glycerin, and, after an interval of days, we have inoculated the glycerinated virus into normal monkeys. In the experiment to be reported, the cord of Monkey 40, of the second generation of virus K, was kept in glycerin for seven days, after which, the glycerin having been washed away with salt solution, and the suspended tissue recovered by centrifugalization, it was inoculated intracerebrally into Monkey 35. This latter animal developed paralysis on the tenth day after inoculation and showed the characteristic microscopic lesions of epidemic poliomyelitis in the spinal cord and brain.

In order to determine whether this effect was produced by the living virus or by an adherent toxic body, the cord of Monkey 35 was injected into Monkey 58, which developed paralysis eleven days after the inoculation. The lesions in the latter monkey were also characteristic.

The next series of experiments was planned to determine the probable size of the organism producing epidemic poliomyelitis, so far as this could be accomplished by the use of mechanical filters. The experiment, to be related briefly, was made with the cord of Monkey 56, which succumbed to the fifth generation of virus K. The cord was triturated with sterile quartz sand, mixed with salt solution, thoroughly shaken and pressed through a Berkefeld filter. The clear and bacteriologically sterile filtrate was injected intracerebrally into Monkey 68, which developed paralysis on the seventh day following the inoculation. That this effect is due to living organisms, and not to soluble toxic bodies, has been shown by transferring the disease to healthy monkeys by means of the spinal cord obtained from monkeys that succumbed to a filtrate.

From the foregoing experiments, taken in conjunction with the negative results of bacteriologic and histologic examinations, it would appear that the infecting agent of epidemic poliomyelitis belongs to the class of the minute and filterable viruses that have not thus far been demonstrated with certainty under microscope.

In a few instances in which parallel injections were made in the subcutaneous tissue and the brain, the monkey inoculated in the first way developed paralysis and the other escaped affection.

The virus has now been shown, by inoculation experiments, to be contained in the spinal cord and brain, but it is not known, and it has yet to be determined, whether it is present in the blood and other organs. We have produced the disease in a monkey by injecting an emulsion of the regional (axillary and inguinal) lymphatic glands communicating with a nodule set up by a subcutaneous injection of the virus that had induced paralysis. Two other monkeys were inoculated at the same time—one from the spinal cord and the other from the local subcutaneous lesion. Both developed paralysis, but the latter after a longer interval than the former. The blood taken at the height of the disease from an affected monkey, defibrinated, and injected into the circulation of a healthy monkey is capable of causing the disease.

The degree of resistance of the virus is being studied. It has been determined that spinal cord from a human case (K) of poliomyelitis retains its virulence apparently unimpaired on being kept constantly frozen at -2° to -4° C. in the Frigo apparatus for a period of at least forty days, and also when kept for at least fifty days at a temperature of about $+4^{\circ}$ C., during which time the latter specimen of spinal cord became slowly softened through autolysis and overgrown superficially with mould. These experiments have a bearing on the epidemiology of the disease and indicate that the reduction in cases which occurs with the onset of cold weather does not depend upon the destruction of the virus, although it may have to do with an effect on its multiplication. Moreover, the spinal cord of an affected monkey still transmits the disease after having been suspended for at least seven days over caustic potash in a desiccator.

Can the virus be cultivated artificially? Portions of a bacteria-free filtrate were inoculated into bouillon containing 10 per cent. of rabbit's serum which had been rendered perfectly clear and sterile by being put through a Berkefeld filter. One c.cm. of a filtrate was mixed with 9 c.cm. of the serum bouillon and

incubated. On the second day the fluid in the upper half of the tube was cloudy; the turbidity increased, and on the fourth day the fluid was used for inoculation into a monkey, which developed paralysis on the thirteenth day. A single loop of this turbid fluid did not set up turbidity in other tubes of the same medium. A second series of cultivation tests, still in progress, has been made with a human ascitic-fluid-bouillon, made perfectly clear by filtration through Berkefeld filters. Perfectly clear filtrates, prepared from the spinal cord of affected monkeys, added to the ascitic-fluid-bouillon, develop turbidity in the thermostat in twenty-four hours or less, and the turbid fluid inoculated into fresh, clear tubes of the same medium causes them to become turbid. The clear filtrates do not produce turbidity on incubation in simple bouillon. None of the turbid fluids contained bacteria that could be seen under the microscope or cultivated in nutrient agar, and the dark field microscope showed no definite bodies.

Does an attack of epidemic poliomyelitis that is recovered from afford immunity to reinfection? Experimental poliomyelitis in monkeys is a very severe disease and, in our series, it has produced death in fully 40 per cent. of the inoculated animals that have developed paralysis. When recovery occurs, residues of paralysis persist; and when death occurs, or when the animals are killed some weeks later, atrophy of the gray matter of the spinal cord, corresponding to the paralyzed limbs, is present. We have reinoculated several of the recovered monkeys and have noted in some instances failure of the virus to act while causing paralysis in the control monkeys. A single example will be given.

Monkey 45 was inoculated into the brain on November 6, 1909. November 13th, tremulous and sick; November 15th, left leg weak; next day the leg is paralyzed; November 24th, general health good, but paralysis persists; November 30th, health excellent except for paralysis. On this day reinoculated together with two controls. Both of the latter became paralyzed, but the reinoculated animal has remained well.

Can the course of an intracerebral inoculation be modified by the simultaneous injection beneath the skin of a virus altered by heating? In seeking for facts relating to artificial protection from, or resistance to, infection, a considerable quantity of an emulsion of active spinal cord, which had been warmed to 55°-57° C. for one hour, or to 60°C. for one-half hour, was injected

beneath the skin at the same time that a usual intracerebral injection of virus was given. The two monkeys employed in the experiment developed paralysis in the usual manner.

We have studied the mucous membrane of the nasopharynx with reference to the virus of poliomyelitis. The entire mucosa of these parts, in monkeys recently paralyzed, has been excised, rubbed up with quartz sand, pressed through a bacteria-tight Berkefeld filter, and injected in the usual manner into the brain of monkeys. By employing this method, we have been able to produce paralysis and thus to prove that the mucous membrane contains the virus of poliomyelitis. We have also found that when the virus is injected into the spinal canal by lumbar puncture it sets up the disease and causes the characteristic paralysis. The cerebrospinal fluid removed from monkeys at the onset of paralysis is altered; it contains an excess of proteid and lymphocytes and coagulates spontaneously. Paralysis also follows the inoculation of this fluid into the brain.

These experimental results show that a path of elimination of the virus of poliomyelitis is by way of the nasopharyngeal mucosa and indicate that the same path may be traversed in the course of infection. Hence it would seem desirable, at the present stage of our knowledge, to deal prophylactically with epidemic poliomyelitis, as with epidemic cerebrospinal meningitis, by disinfecting and destroying the secretions of the nasal and buccal cavities.

Brief mention should be made of other species of animals that have been employed for inoculation. Besides many guinea pigs and rabbits, one horse, two calves, three goats, three pigs, three sheep, six rats, six mice, six dogs, and four cats have had active virus introduced in the brain, but without causing any appreciable effect whatever. These animals have been under observation for many weeks.

In the literature on epidemic poliomyelitis in human beings, reference is made to sensory cutaneous disturbances. In every instance in which we have looked for them we have found lesions, similar to those in the spinal cord and brain, in the intervertebral ganglia obtained from the paralyzed monkeys.

It need hardly be pointed out how much our knowledge of this severe disease has been extended in a few months by the employment of the experimental method in its study.

THE DWARF TAPEWORM (HYMENOLEPIS NANA*) AS AN INTESTINAL PARASITE OF CHILDREN, WITH THE REPORT OF FOURTEEN CASES.

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In the routine examination of the feces of children for the ova of intestinal parasites the writer has found evidence of infection with the dwarf tapeworm in 14 out of 230 examinations†. These figures, if borne out by further investigations, indicate that the dwarf tapeworm is not only the commonest cestode parasite, but is one of the most common of all intestinal parasites in early life.

Hymenolepis nana was first discovered in man by Bilharz in 1851, and is the smallest cestode which has a human host. Dwarf tapeworm infections have been reported from a number of countries, and in certain parts of Sicily it is estimated that 10 per cent. of the children harbor this worm.

Although a case of infection with *Hymenolepis nana* was reported by Spooner¹ in Philadelphia in 1873, the prevalence of this parasite was not suspected until 1903, when Stiles² reported his observations. Out of 160 persons examined between Richmond, Va., and Florida, Stiles found 4 cases of dwarf tapeworm infection, and of these, 3 were in individuals under sixteen years of age. His assistants found 6 cases out of 123 children examined in a Washington orphanage.³ In 1904, Ransom⁴ collected all of the reported cases of dwarf tapeworm infection, and out of 106 cases recorded 12 were from this country.‡ Thirty-eight of the 106 cases were in individuals under fifteen years of age and 41 other cases were simply characterized as children. Assuming that the ages of the latter ranged below fifteen years there was a total of 79 cases, a percentage incidence of 74.52 per cent. in children.

Hallock⁵ reported 2 cases of dwarf tapeworm infection in 1904 from Buffalo, N. Y. Both of his patients were adults who had served as soldiers in the Philippines, where the infection was probably acquired. Moore,⁶ in 1904, reported a case from Texas.

* Synonyms, *Tenia murina*, *Tenia nana*.

† The results of these examinations in reference to other intestinal parasites will be reported in a separate paper.

‡ In a footnote, Ransom adds 13 additional cases from the United States, which includes the 6 cases from the Washington Orphanage. This makes a total of 25 American cases.

This patient was also an adult. In 1905 a case of dwarf tapeworm infection in a twelve-year-old child, a native of North Carolina, was reported by Long.⁷ Lambert⁸ reported a case in a male aged twenty-two years in 1906. This patient was of German birth, but had resided in New York for several years. In 1906 Deaderick⁹ reported 4 cases in children. His patients were natives of Arkansas and their ages were five, seven, ten and eleven years, respectively.

Before proceeding to the medical aspect of *Hymenolepis nana* infections a short description of the parasite and ova will be given.*

The length of the worm in man varies from 12 to 15 mm. according to Blanchard,¹⁰ and is slightly more than 20 mm. according to Mertens.¹¹ The latter investigator found the maximum breadth to vary from 0.7 to 0.9 mm., the former from 0.5 to 0.7 mm. The writer measured 10 specimens of the worm from each of 8 cases and found the average length of the intact worm to be 14 mm. with variations from 16 to 30 mm. The average maximum breadth was 0.7 mm. with variations of from 0.5 to 1 mm. The worms from the same case were not of uniform size, but often varied within the limits mentioned.

In some cases, however, the average size was greater than in others. Blanchard found the complete worm composed of



FIG. 1.
HYMENOLEPIS NANA.
A. One-half actual size.
B. Enlarged; showing
head and suckers.

from 110 to 200 segments, Mertens from 180 to 200. In the specimens examined by the writer the number of segments varied from 150 to 200.

Toward the distal end, the breadth of the worm is almost uniform for one-fourth to one-third of its total length. Succeeding this portion the breadth diminishes rather sharply and then decreases but little to the beginning of the neck. The segments are three to six times as broad as long and the distal ones

* For a more detailed description the reader is referred to the excellent monograph of Ransom or the text-books on helminthology.

contain the ripe ova. The neck is slender, and is surmounted by a globular head. The head has four suckers and a rostellum armed with twenty to thirty bifid hooklets. In man, the habitat of the worm is the upper two-thirds or three-fourths of the ileum.

The eggs of *Hymenolepis nana* are slightly oval and vary in size from 36μ by 32μ to 56μ by 42μ . (Ransom.) In common with the other species of the genus *Hymenolepis*, they show two definite membranes with a rather wide space between. The embryo containing three pairs of hooklets lies within the inner membrane. The inner membrane or shell presents a slight abrupt projection at each pole, from which fine filaments arise and ramify within the space between the membranes. The polar projections and filaments are characteristic, but are not always visible; a careful search, however, will usually reveal them in some of the ova.



FIG. 2. EGGS OF *HYMENOLEPIS NANA*. (Greatly enlarged.)

The ova are usually colorless, always so in the fresh feces, but on standing they occasionally acquire a faint yellowish or brownish tint. Since most patients harbor many of the worms, the feces usually contain great numbers of ova.

The 230 children examined by the writer were between the ages of two and twelve years, and were from the poorer classes, who live in the tenement-house districts of New York City. The examinations were made as nearly consecutive as possible on all children within the mentioned age limits from the families whose members were being treated at the clinic. From these examinations, 67 children were found to harbor intestinal worms, 14 (20.8 per cent.) of whom were infected with *Hymenolepis nana*. Considered in relation to the number of examinations, *Hymenolepis nana* was present in 6.08 per cent. of the 230 children examined. At the same time there were only 5 cases of infection with the larger cestodes (all *Tænia saginata*). The 14 cases of dwarf tapeworm infection were from the members of five families.

REPORT OF CASES.

FAMILY G.—The parents were born in Russia, the children were born in New York City. There were four children between two and twelve years of age, and of these three were infected with *Hymenolepis nana*.

CASE I.—E., female, aged two. This child was well nourished, and, with the exception of an attack of measles and summer complaint, had been in good health. The physical examination was negative. Numerous ova (average of one egg to three low power fields, Leitz No. 3 obj., ocular No. 3) of *Hymenolepis nana* were found in the feces, but there were no symptoms which could be attributed to the tapeworm infection. The leukocytes were 8,000 per cubic mm., the hemoglobin, 75 per cent. (Sahli Haemometer), and the differential count of 500 white cells, as follows: Polynuclear cells, 28.4 per cent.; lymphocytes, 28.9 per cent.; large mononuclear and transitional cells, 39 per cent.; eosinophiles, 2.4 per cent. After appropriate treatment, over 200* dwarf tapeworms were expelled. Sixteen days later the feces was free from ova.

CASE II.—S., male, aged four. This patient was well nourished and developed, but for two months had suffered from the following symptoms: Restlessness at night, enormous appetite and frequent attacks of abdominal pain. The pain was not very severe, had no relation to food and was referred to the epigastrium. The mother complained that the child constantly scratched his nose. The temperature was normal, and a physical examination showed nothing of importance. Numerous ova (average of one egg to three low power fields, Leitz obj., No. 3, ocular No. 3) of the dwarf tapeworm were found in the stools, and the blood examination was as follows: Hemoglobin, 70 per cent. (Talqvist scale); white cells, 14,000 per cubic mm.; differential count of 500 cells; polynuclear cells, 60 per cent.; lymphocytes, 18 per cent.; large mononuclear and transitional cells, 12.8 per cent.; eosinophiles, 9 per cent.; basophiles, 0.1 per cent. The routine treatment expelled 150 to 200 dwarf tapeworms. After treatment the child showed great improvement; sleep was uninter-

* It is impossible to estimate with absolute accuracy the number of worms expelled. If only those containing heads are counted the figures will be much too low, as the heads become broken off and their size is such that it is extremely difficult or impossible to find them. On the other hand, if each part of a worm is counted the numbers would be too high. The figures given represent a count of the intact worms and of parts of the worm which consisted of the expanded lower extremity and part of the neck. The figures are in consequence too low rather than too high.

rupted, and up to six weeks later there has been no recurrence of the abdominal pain. The itching of the nose has also subsided. Three weeks after treatment a very few ova were found in the feces (average of one egg to three specimens).

CASE III.—F., female, aged ten. This patient, a thin, nervous girl, complained of three to four attacks of nausea each day. These attacks were not accompanied by vomiting. She also complained of a frequent feeling of abdominal depression, which she likened to the sensation experienced on the sudden descent of an elevator.* There were also sensations of numbness and tingling in the right hand and transitory pains in the right thigh. The appetite was poor. These symptoms had been present for about one month. With the exception of the evident loss of weight and a moderate degree of tonsillar hypertrophy, the physical examination was negative. Examination of the feces showed numerous ova of *Hymenolepis nana*. The hemoglobin was 60 per cent. (Sahli Haemometer), the red cells, 4,100,000, and the leukocytes, 16,000 per cubic mm. The latter were present in the following proportions: Polynuclear cells, 50.7 per cent.; lymphocytes, 21.2 per cent.; large mononuclear and transitional cells, 20.5 per cent.; eosinophiles, 7.2 per cent.; basophiles, 0.2 per cent. One thousand cells were counted. The usual treatment expelled 600 dwarf tapeworms, and no ova were found in the feces sixteen days later. The child is still nervous, but with this exception the symptoms have entirely disappeared. She has gained weight and the hemoglobin has risen to 70 per cent. six weeks after treatment.

The remaining child in this family is a fairly healthy boy of twelve years.

FAMILY S.—Both of the parents were born in New York and there are seven children, all American born, five of whom were infected with *hymenolepis nana*.

CASE IV.—C., female, aged two. This patient was a well nourished and well developed child with normal appetite. For one month the child had slept poorly. She was very restless, ground her teeth during the night and would frequently cry out during sleep. The child was very irritable. With the exception of these symptoms the patient showed nothing abnormal. The

* Stiles, in an experimental *Taenia saginata* infection in himself, mentions this sensation as the most prominent symptom. *Modern Medicine*, Osler and McCrae, 1907, Vol. I., p. 570.

hemoglobin was 65 per cent. (Sahli Haemometer), the white cells, 15,000 per cubic mm., and in the following proportions: Polynuclear cells, 57.7 per cent.; lymphocytes, 17.5 per cent.; large mononuclear and transitional cells, 16 per cent.; eosinophiles, 6.5 per cent.; basophiles, 1.2 per cent. Five hundred cells were counted. After the expulsion of 150 dwarf tapeworms the child seemed entirely normal, and was free from symptoms. Fifteen days after treatment the feces was free from ova. There has been no recurrence of the symptoms one month after treatment.

CASE V.—O., male, aged three. A well nourished child with normal appetite and bowel movements. He was restless at night and ground his teeth during sleep. He was very irritable, and suffered from frequent attacks of nausea and vomiting, for which no adequate cause could be found. These symptoms had been present for about six weeks. The physical examination showed nothing abnormal. A microscopical examination of the feces showed a moderate number of the ova of *Hymenolepis nana*. The hemoglobin was 70 per cent. (Sahli Haemometer), and a differential count of 500 white cells, as follows: Polynuclear cells, 42.5 per cent.; lymphocytes, 41.5 per cent.; large mononuclear and transitional cells, 8 per cent.; eosinophiles, 6.9 per cent.; basophiles, 0.5 per cent. About 100 dwarf tapeworms were expelled after treatment, but eighteen days later the feces still contained a few ova (average of one egg to two preparations). The symptoms, however, have entirely disappeared, and at the present time (five weeks after treatment) the child seems normal.

CASE VI.—Ol., female, aged seven. For ten months this patient had lost weight; she had become pale, listless, and easily tired. She frequently complained of pains in the lower limbs, which were worse at night and frequently interrupted sleep. She also complained of abdominal pain, which was referred to the epigastrium. This pain was transient and not severe. The physical examination showed a rather thin, pale child with puffiness of the lower eyelids and moderately enlarged tonsils. The urine showed nothing abnormal. The feces contained numerous ova of *Hymenolepis nana*. The red blood cells were 3,200,000, the white cells, 10,000 per cubic mm. The hemoglobin was 40 per cent. (Sahli Haemometer), and a differential count of 1,000 white cells as follows: Polynuclear cells, 53.5 per cent.; lymphocytes, 35.2 per cent.; large mononuclear and transitional cells, 7 per cent.; eosinophiles, 3.2 per cent.; basophiles, 1 per cent. A few normoblasts

were present, and a number of the red cells were smaller than normal (microcytes). About 700 dwarf tapeworms were expelled, after which there was a perceptible improvement in the patient's condition. She still has occasional pains in the lower limbs, but they are much less severe. With this exception, the symptoms have disappeared. The hemoglobin is now 55 per cent. (one month after treatment), and no nucleated red cells are present in a stained blood smear. A very small number of ova (one egg to two preparations) can still be demonstrated in the feces.

CASE VII.—G., male, aged nine. This patient was apparently normal and showed no symptoms referable to the tapeworm infection. The feces showed a moderate number of the ova of *Hymenolepis nana* (average of one egg to ten low power fields, Leitz obj., No. 3, ocular, No. 3), and about 200 dwarf tapeworms were passed after treatment. The blood examination before treatment was as follows: Hemoglobin, 75 per cent. (Talqvist scale); differential count of 500 white cells; polynuclear cells, 35.6 per cent.; lymphocytes, 27.5 per cent.; large mononuclear and transitional cells, 33.8 per cent.; eosinophiles, 2.2 per cent.; basophiles, 0.3 per cent. The feces was free from ova three weeks after treatment.

CASE VIII.—M., female, aged eleven. This patient showed no symptoms referable to the tapeworm infection. The feces contained the ova of *Hymenolepis nana* (average of one egg to thirty low power fields). The hemoglobin was 80 per cent. (Talqvist scale), and a count of 500 white cells showed the following percentages: Polynuclear cells, 42 per cent.; lymphocytes, 31.2 per cent.; large mononuclear and transitional cells, 22.5 per cent.; eosinophiles, 4 per cent.; basophiles, 0.3 per cent. About fifty dwarf tapeworms were expelled by treatment, and no ova were found in the feces sixteen days later.

The other two children in this family, aged seven and twelve years, were apparently normal.

FAMILY C.—There were three children in this family between two and twelve years of age, two of whom were infected with *Hymenolepis nana*. The parents were born in Sicily, as was the child T., who came to New York at the age of four. The other children were born in New York City. An examination of the feces of the parents was negative.

CASE IX.—J., female, aged five. This patient was fairly well nourished, but was pale and complained of frequent headaches

and occasional attacks of epigastric pain. Of late there had been several attacks of the pain each day. The patient was nervous and was restless at night. The appetite was poor and the bowel movements normal. Physical examination disclosed no cause for these symptoms, and an examination of the feces showed a moderate number of the ova of *Hymenolepis nana*. The hemoglobin was 65 per cent. (Sahli Haemometer), the white cells, 18,000 per cubic mm., and were present in the following percentages: Polynuclear cells, 40.7 per cent.; lymphocytes, 32 per cent.; large mononuclear and transitional cells, 16.7 per cent.; eosinophiles, 9.2 per cent.; basophiles, 1.2 per cent. One thousand cells were counted. Treatment was given, but through an error the feces was not saved. Twenty days later a very small number of ova (one egg to three preparations) were present in the feces. With the exception of an occasional headache, the child is entirely free from symptoms, eight weeks after treatment.

CASE X.—T., female, aged ten. This child was rather thin, but complained of no symptoms which could be attributed to the tapeworm infection. The physical examination was negative. A moderate number of the ova of *Hymenolepis nana* and a few of *Trichuris trichiura* were found in the feces. The hemoglobin was 70 per cent. (Talqvist scale), and a differential count of 500 white cells was as follows: Polynuclear cells, 42.2 per cent.; lymphocytes, 40.8 per cent.; large mononuclear and transitional cells, 14.8 per cent.; eosinophiles, 2.7 per cent. The feces was not saved after treatment, but sixteen days later an examination showed a very small number of the ova of *Hymenolepis nana* and *Trichuris trichiura*.

The remaining child in this family is poorly nourished and pale, but complains of no symptoms. Several examinations of his feces were negative.

FAMILY CH.—The parents were both of Italian birth; all of the children were born in New York City. There were five children between two and twelve years of age, three of whom were infected with *Hymenolepis nana*.

CASE XI.—A., male, aged three. This child had no symptoms due to helminthiasis. The feces showed a moderate number of ova of *Hymenolepis nana*, and the usual treatment was given. No estimate could be made of the number of worms expelled as part of the feces was thrown away. Eighteen days after treatment the feces contained no ova. The blood examination before treat-

ment showed 75 per cent. hemoglobin (Sahli Haemometer), and a differential count of 500 white cells was as follows: Polynuclear cells, 45.2 per cent.; lymphocytes, 40 per cent.; large mononuclear and transitional cells, 11.6 per cent.; eosinophiles, 2.1 per cent.; basophiles, 0.5 per cent.

CASE XII.—An., female, aged 6. The feces of this patient showed a moderate number of the ova of *Hymenolepis nana*, but there were no symptoms attributable to the tapeworm infection. The hemoglobin was 70 per cent. (Talqvist scale), and a differential count of 500 leukocytes as follows: Polynuclear cells, 66 per cent.; lymphocytes, 20.3 per cent.; large mononuclear and transitional cells, 11 per cent.; eosinophiles, 1.1 per cent.; basophiles, 0.5 per cent. The usual treatment was given, but the number of worms expelled could not be determined, since only part of the feces was saved. Three weeks after treatment the feces still contained a very small number of ova.

CASE XIII.—F., male, aged nine. For about five weeks this patient had lost weight; he was easily tired, slept poorly and frequently cried out during sleep. He also ground his teeth during the night. He complained of continual itching of genital region and of nose. The appetite was capricious; at times meagre, at others inordinate. The physical examination showed nothing important except evidence of slight loss of weight and pallor of the skin and mucous membranes. The feces contained numerous ova of *Hymenolepis nana*. The hemoglobin was 65 per cent. (Sahli Haemometer), the red blood cells, 3,800,000, and the white cells, 24,000 per cubic mm. A differential count of 1,000 white cells gave the following percentages: Polynuclear cells, 44.3 per cent.; lymphocytes, 20.2 per cent.; large mononuclear and transitional cells, 11.1 per cent.; eosinophiles, 22.6 per cent.; basophiles, 1.2 per cent. Numerous dwarf tapeworms were expelled after treatment, but three weeks later the feces still contained a few ova (average of one egg to four preparations). The symptoms have almost entirely disappeared and the patient has gained weight. Three weeks after treatment the hemoglobin was 70 per cent., and the differential blood count was as follows: Polynuclear cells, 64.1 per cent.; lymphocytes, 21.6 per cent.; large mononuclear and transitional cells, 11 per cent.; eosinophiles, 2 per cent.; basophiles, 0.5 per cent. A second treatment was given three weeks later. The feces was examined after twenty days, but no ova were found. The patient seems entirely normal.

FAMILY W.—The parents were born in New York State, and the one child, between two and twelve years of age, was born in New York City.

CASE XIV.—E., female, aged four. For two months this patient had nocturnal enuresis and complained of intense itching of the genitals and nose. The appetite was excessive, the bowel movements normal. The hemoglobin was 70 per cent. (Sahli Haemometer). The white blood cells were 16,000 per cubic mm., and a differential count of 500 cells as follows: Polynuclear cells, 48 per cent.; lymphocytes, 21.5 per cent.; large mononuclear and transitional cells, 20 per cent.; eosinophiles, 8.1 per cent.; basophiles, 0.5 per cent. Treatment was given, but the total number of worms expelled could not be estimated, as only part of the feces was saved. Twenty days after treatment the feces was free from ova. The child is now apparently well. The bed-wetting occurred twice since the administration of treatment, but has not occurred in three weeks. Ten days after treatment the eosinophile cells were 3.1 per cent.

With one exception, all the patients were born in New York City. This child (Case X.), who was born in Sicily, came to this country at the age of four years, and it is possible that she was infected at this time. All of the patients lived under the rather unfavorable hygienic conditions common to the poorer classes in New York City.

Symptomatology.—In the account of the 101 cases analyzed by Ransom, the presence or absence of symptoms was mentioned in 49. Three of these patients suffered from no symptoms referable to the tapeworm infection, and in 9 cases the symptoms were very slight. In 1 patient, who harbored thousands of the worms, slight abdominal pain was the only symptom mentioned. In 4 additional cases the severity of the symptoms was not defined. There were 31 cases in which the symptoms were more or less severe, but in only 17 of these could they be definitely laid to the intestinal parasites, judging from the influence of treatment and the exclusion of other causes.

In 13 of these 17 cases the main symptoms were gastrointestinal. Appetite was increased in 3 cases, perverted in 1. Eleven cases showed abdominal pain or paresthesia, and 3 suffered from diarrhea. "In 1 case there was a sensation of crawling in the abdomen, and heat in the epigastrium; in another, pain, and crawling and gnawing sensations; in another case, pain and a

sense of pressure; it was noted in 1 case that the pain in the epigastrium increased on palpitation; in 2 cases the pains were frequent."

Fifteen cases had symptoms referable to the nervous system. In 11, spasms or convulsions were reported, and in 7 were classified as epileptiform. Three of the 7 cases were reported cured after treatment; in 4 the symptoms disappeared for some time and later recurred, and in 2 there was no reappearance of the ova at the time of recurrence. In 2 cases clonic spasms of the extremities was mentioned.

Fever was reported in 3 cases. In 2 cases dyspnea was present, in one of two years standing, and the dyspnea disappeared after the expulsion of *Hymenolepis nana*. Emaciation was a feature of 1 case, and 1 patient suffered from nocturnal enuresis.

Many other symptoms are recorded in the cases collected by Ransom, but the ones given are the more important and those most likely due to the presence of the parasite.

In 1 of Deaderick's¹² cases abdominal pain, diarrhea and vomiting were prominent symptoms (Case I.); in another, nausea, vomiting, dizziness, headache and dyspnea were noted (Case II.). A third patient suffered from vomiting, abdominal pains, headache, dyspnea, dizziness and diarrhea (Case IV.). This patient showed subcutaneous edema over the ankles. In 2 of the 3 cases cited above the symptoms disappeared after treatment (Cases I. and IV.). The third case improved, but was lost track of (Case II.). The fourth case reported by this writer (Case III.) disappeared from observation so early that it is impossible to determine the relationship of the symptoms to the tapeworm infection.

The symptoms in the case reported by Long¹³ were very striking. The patient, a child of twelve years, was pale, anemic, and suffered from choreiform movements. Arsenic had no influence on the disease, and six months later the patient had a severe attack of abdominal pain; at this time the pulse was 120 and the temperature 101½° F. Repeated attacks of colic occurred, and following the fourth an epileptiform convulsion. Ova of *Hymenolepis nana* were discovered in the feces at this time and treatment administered. The recovery was complete and the symptoms entirely disappeared.

Six of the 14 cases observed by the writer showed no symptoms referable to the presence of the parasite; the remaining 8

patients suffered from symptoms of varying severity. In 5 cases the symptoms may be classified as mild; in 2, moderate, and in 1, severe.

Five patients (Cases II., III., V., VI. and IX.) suffered from gastrointestinal symptoms. Three of these (Cases II., VI. and IX.) had attacks of abdominal pain. One patient (Case V.) suffered from frequent nausea and vomiting, and 1 (Case III.) from nausea unaccompanied by vomiting. In 2 cases (Cases II. and VI.) the abdominal pain was mild and transient; in the other, rather severe. In all 3 cases the pain was referred to the epigastrium and was unaffected by pressure. One patient (Case III.) had abdominal paresthesia in the nature of a sudden sinking sensation. Appetite was increased in 2 cases (Cases II. and XIV.), was meagre in 3 (Cases III., VI. and IX.), capricious in 1 (Case XII.), and normal in the remaining 3 cases.

Seven patients had reflex nervous disturbances. In 4 cases (Cases IV., V., IX. and XIII.) sleep was interrupted and the patients were restless during the night; 2 patients ground their teeth during the night (Cases IV. and V.). In 3 cases (Cases II., XII. and XIV.) itching of the nose was noted, and in 2 of these (XIII. and XIV.) it was associated with genital pruritis. One patient (Case III.) complained of numbness and tingling in one hand. In 2 cases (Cases IV. and V.) the mother noticed that the child had become irritable.

Pain in the lower limbs was present in 2 patients (Cases III. and IV.); it was mild in 1 (Case III.); in the other sufficiently severe to awake the child from sleep. Edema of the lower eyelids was present in 1 case (Case VI.), and headache in 1 case (Case IX.). In 2 cases emaciation was a rather prominent feature (Cases VI. and XIII.).

The relation of the above symptoms to the tapeworm infection was shown by the lack of other adequate cause for their production and by their prompt disappearance or amelioration after appropriate treatment.

An analysis of the blood examinations shows the following important features: Eosinophilia was present in 7 instances, and the percentage of the eosinophile cells ranged from 6.5 to 22 per cent. In cases not showing symptoms due to the presence of *Hymenolepis nana*, eosinophilia was uniformly absent. In 7 of the 8 cases showing symptoms the eosinophile cells were increased. The exceptional case (Case VI.) was one of rather severe sec-

ondary anemia with pronounced symptoms of long duration. The absence of eosinophilia in severe or long-standing infection with animal parasites has been noted by Boycott¹⁴ and by Ashford and King¹⁵ in uncinariasis, and by Opie¹⁶ in experimental infections with *Trichina spiralis*. The occurrence and significance of eosinophilia in helminthiasis will be considered in detail in a later paper.

Complete blood examinations were made in 3 cases* (Cases III., VI. and XIII.), and in all secondary anemia was present. In 1 case the blood contained microcytes and normoblasts (Case VI.). The degree of anemia was mild in 1 case, moderate in 1 and severe in the 3d. Two of the above cases showed a leukocytosis associated with eosinophilia (Cases II. and XIII.); in the 3d case (Case VI.) neither the eosinophiles nor the leukocytes were increased.

The leukocytes were counted in 5 additional cases (Cases I., II., IV., IX. and XIV.), 4 of which showed an eosinophilia associated with leukocytosis. In Case I. neither the percentage of eosinophile cells nor the number of leukocytes was increased. In several of the cases the large mononuclear and transitional cells were increased, but this had no apparent relation to either the symptoms or the severity of infection.

In the 4 cases reported by Deaderick,¹⁷ the eosinophile cells were 11.5 per cent., 15 per cent., 9 per cent. and 26 per cent., respectively. All of these patients suffered from symptoms apparently due to the tapeworm infection. Bücklers¹⁸ records an eosinophile count of 7 per cent. in a child who harbored *Hymenolepis nana*. The presence or absence of symptoms is not noted.

Pathology.—The cause for the production of symptoms in helminthiasis is not perfectly clear. It is also very obscure why one patient suffers definite symptoms, while another may harbor an equal number of parasites and show no ill effects. It is unnecessary to discuss the various hypotheses advanced, but in the case of the dwarf tapeworm the evidence points toward either a toxic or a purely mechanical influence. It has been found in autopsies that the presence of these parasites is capable of producing considerable inflammatory reaction in the intestinal wall, and, although the parasite is of small size, it is usually present in such

* In all cases the hemoglobin was determined and a differential count of the leukocytes made from blood smears stained with Wright's stain. When the leukocytes appeared increased they were counted by means of the Thoma-Zeiss apparatus. The red cells were counted with the Thoma-Zeiss apparatus in cases, showing a low hemoglobin percentage.

great numbers that considerable damage may be done. In the case of the larger cestodes, evidence has accumulated to show that toxic materials are excreted which may have an influence on the host. Although no conclusive experiments have been made with *Hymenolepis nana*, its analogy to the larger cestodes would seem to indicate that some of the symptoms may be of toxic origin. From the nature of the symptoms found in cases of dwarf tapeworm infection, it is not inconceivable that both of the influences mentioned may be factors; that some of the symptoms are due to a toxin excreted by the worm, others to intestinal irritation.

In the cases reported in the literature, the number of parasites varied from a few to thousands. An estimation of the number of worms expelled by treatment could be made in only 8 of my cases. The number ranged from 50, in Case VIII., to 700, in Case VI.

Mode of Infection.—The means by which parasitic worms gain access to the intestinal canal of human beings is either directly through the ingestion of ova or through the ingestion of an intermediate host.* Direct infection through the ingestion of ova is exemplified by round-worm, thread-worm and whip-worm infection. Other parasites require an intermediate host before human infection is possible, and this is the case with *Tænia solium* and *Tænia saginata*. Human infection with the latter does not occur from the ingestion of ova, but it is necessary that the ova be first ingested by cattle, in whose muscles the embryos become encysted, forming the cysticercus stage. It is upon ingesting the cysticerci in the flesh of cattle that man becomes infected.

Owing to its relationship to the larger cestodes, an intermediate host was sought for *Hymenolepis nana*, but up to the present time a cysticercus stage of this parasite has not been discovered in any human food.

Previous to the report of the first case of human infection with *Hymenolepis nana*, a similar tapeworm† (*Tænia mudina*) was found by Dujardin in the intestine of a brown rat. Further investigations have shown that this parasite is not uncommon in rats and mice, and while the worm found in rodents presents slight differences, it is considered generically and specifically the same as the dwarf tapeworm of man.

* An exception is the case of the hookworm, where infection may result from skin inoculation.

† For the data in this section, the writer wishes to acknowledge his indebtedness to the monograph of Ransom.

In Catania, where human infections with *Hymenolepis nana* are comparatively common, Grazzi found that the parasite was also common in rats. By experiments on rats, this investigator found that infection directly followed the ingestion of the ova. He also noted that the embryo first became embedded in the intestinal mucosa, forming a cysticercoid stage, and later re-entered the intestine to develop into the adult worm. Thus the experiments of Grazzi indicate that the rat acts as both the definitive and intermediate host, and it is possible that the development in man follows a similar course. Grazzi fed the ova of *Hymenolepis nana* to eight persons, in one of whom the parasite developed. This was in the case of a five-year-old boy, who began to pass the ova fifteen days after ingesting several segments of *Hymenolepis nana* from a rat. After treatment, fifty worms were expelled. Grazzi also mentions the case of a boy, whose feces were previously free from the ova of *Hymenolepis nana*, who became infected after collecting the feces of an infected patient. This writer further noted that in certain families secondary cases of dwarf tapeworm infection developed two to four months after some of the children were found to harbor the parasite. These investigations, however—as admitted by Grazzi—are not entirely conclusive, since they were made in a country where the parasite in question is common.

Some of the writer's cases show points which may have some bearing on the question of infection. In all of the families—with the exception of the Family W.—more than one child was infected. In this family, however, the infected child was the only member between two and twelve years of age. In the Family G., Case I. was free from infection at the time of the first examination. A second examination, two weeks later, also gave negative results, but three weeks later ova were discovered in the feces. Similarly in the Family S., the feces of Case XI. was negative at the time the ova were found in the feces of the other children. A second examination, three weeks later, also gave negative results, but after another interval of sixteen days the feces showed a moderate number of the ova of *Hymenolepis nana*.

It seems scarcely possible that these patients could have been infected through the ingestion of food containing a hitherto undescribed cysticercus (or cysticercoid) stage of *Hymenolepis nana*. All of the 230 children examined came from the same social class and consumed practically the same kind of food. It is only

reasonable to suppose that if the food were the medium of infection a greater number of children would have shown the presence of the parasite.

The houses in which all of these patients lived were infested with rats and mice, and in the effort to determine whether they might play a part in disseminating the infection the writer examined 5 mice and 1 rat from the abode of the family Ch., and 2 mice from that of the family G. Three of the mice were found to harbor tapeworms which did not correspond to the descriptions of *Hymenolepis nana*. The small intestine of the rat contained two tapeworms whose size, ova and gross morphology indicated that they were *Hymenolepis nana*.

A point of some interest in connection with this parasite concerns the possibility of autoinfection. Although direct proof is lacking, its occurrence is probable. Abundant opportunity for autoinfection is offered by the great numbers of ova passed in the feces; and the fact that patients usually harbor so many worms seem to argue for repeated rather than single infections.

This section may be concluded by saying that the failure to demonstrate an intermediate host, the experiments of Grazzi, and the clinical features of dwarf tapeworm infection point to the fact that the mode of infection with this parasite is direct. The dwarf tapeworm infection follows the ingestion of the ova.

Diagnosis.—The diagnosis is easily made by finding the characteristic ova in the feces and may be confirmed by obtaining the parasite after treatment. To examine the feces it is only necessary to mix a small portion with sufficient distilled water to make a translucent mixture. A drop of this placed on a slide and covered with a cover-slip should be first examined with a comparatively low power (the Leitz No. 3, objective or an equivalent); when suspicious bodies are seen a higher magnification may be used to determine their nature. Eight to ten such preparations should be examined by means of the mechanical stage before pronouncing the feces free from ova. The writer used 2" x 3" slides and 1" x 2" cover-glasses, as by this means more material can be examined in a single specimen than with the usual size.

The examination should be made with only a moderate illumination and without the use of the condenser. Owing to the transparency of the eggs they may be easily overlooked if the light is too strong.

Grazzi mentions that the ova of *Hymenolepis nana* may tem-

porarily disappear from the feces even though many parasites are harbored. Mertens did not find this true in his cases. In some of the writer's cases the number of ova were at times greatly diminished, and this particularly apparent during the administration of rhubarb and sodium bicarbonate. (The official Mist. Rhei et Sodæ.) Though in decreased numbers, the ova could always be found by a careful search.

Occasionally the segments of the worm can be found, but they are usually in small numbers; the segments are so small, however, that they are only recognizable by means of a lens.

The only ova which might be a source of confusion are those of *Hymenolepis diminuta*. The radially striated external membrane of these ova and the absence of filaments serve as distinguishing features. Moreover, *Hymenolepis diminuta* is a very uncommon human parasite; in size and morphology it is so different from *Hymenolepis nana* that mistake is impossible if the parasite be obtained.

The diagnosis of intestinal worms in general cannot be accurately based on either symptoms or physical examination. In cases of obscure gastrointestinal or nervous disorders in children the possibility of helminthiasis should be remembered and the feces examined for ova.

Prophylaxis.—All infected cases should be recognized and promptly treated; the treatment should be repeated if necessary. Contamination of hands or food with the feces of infected persons should be strictly guarded against. The effort should be made to free all houses from rats and mice since these pests may be a source of infection.

Treatment.—Three to four days before treatment the patient should be placed on a diet consisting mainly of milk, eggs and broths, with very little starchy food. During the preliminary period it is desirable to administer a saline laxative each morning, and for this purpose Epsom or Rochelle salts or magnesium citrate may be used. The object of the preliminary treatment is to have the intestines as empty as possible before the administration of the anthelmintic. On the day previous to the specific treatment the patient should have very little food, and in the evening a large dose of castor oil or an equivalent cathartic should be administered. Male fern (*aspidium filix mas*) is recognized as the only satisfactory remedy, and the oleoresin is the preparation most used. It can be administered in mixture, emulsion, or when

given to older children, in capsules.* It is of great importance that the preparation should be fresh. The dose naturally varies with the age of the patient, but the following doses are usually adequate: From two to four years, $\frac{1}{2}$ dram; from four to six years, 40 grains; from six to twelve years, 1 dram. The remedy is best given on a practically empty stomach and divided into three to five doses administered at one-half hour intervals. One-half hour after the last dose of the anthelmintic a brisk saline cathartic should be given. Male fern is not without danger, as 5 drams have been known to be fatal, but in the doses mentioned little harm is likely to result. It is best, however, to keep the patient very quiet during the period of treatment.

The first treatment may not expel all of the worms, but its effectiveness can be judged by a later examination of the feces for ova. In cases where the treatment is not entirely effective the ova reappear in the feces after an interval of about fifteen days.

In 7 of my cases the first treatment was entirely effective; in 7 cases the ova reappeared in the feces after fifteen days. The failure of a single treatment is probably due to one of two causes, either the heads of the worms are left in the intestine, as sometimes occurs in the case of the larger cestodes, or embryonic stages of the parasite are present at the time of treatment, which later develop into the worm.

SUMMARY AND CONCLUSIONS.

(1) In the routine examination of 230 children between two and twelve years of age, 14 were found to harbor *Hymenolepis nana*.

(2) Eight of these 14 cases showed symptoms due to the presence of parasite.

(3) The symptoms may be divided into two groups: (a) gastrointestinal and (b) nervous.

(4) Eosinophilia was present in 7 of the 8 patients who suffered from symptoms. In the patients who showed no symptoms eosinophilia was uniformly absent.

(5) The number of worms harbored by the different patients ranged from 50 to 700.

(6) It is possible that human infection with *Hymenolepis nana* occurs from contamination of food with the feces of in-

* In the reported cases the following mixture was used: Oleoresin of aspidium, 8 grains; oil of turpentine, 1 minim; chloroform, 2 minims, and mucilage of acacia sufficient to make 1 dram.

fectured rats or mice. The available evidence indicates that infection may follow the ingestion of ova from the feces of infected persons.

(7) The diagnosis is easily established by finding the ova of the parasite in the feces.

(8) Treatment with male fern is effective, but may require repetition.

I wish to acknowledge my indebtedness to Dr. C. W. Stiles for his kindness in examining 5 specimens of ova and 1 specimen of the parasite. The reported cases were from the service of Dr. Eli Long in the pediatric clinic of the New York University and Bellevue Hospital Medical College, and I desire to express my appreciation for the privilege of making this report.

I wish to thank Miss Eleanor Ketcham for assistance in obtaining material and in following the cases.

January 11, 1910.

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SYPHILITIC AORTITIS IN AN INFANT.—Waterman (*Nederl. Tgdschrft. v. Geneeskunde*, I., 1908). The author's findings in the examination of the aorta of a newborn infant enable him to contribute an instance of this very rare affection, congenital syphilitic aortitis. He is inclined to the belief that the disease often remains undiscovered, because the changes can only be demonstrated with the assistance of the microscope. Summary of findings: (1) There is a congenital form of syphilitic inflammation of the aorta. (2) The inflammatory process affects principally the media and adventitia of the vessel. (3) This congenital vascular affection is, just as acquired syphilis, an etiologic factor in the origin of aortic aneurism.—*Medical Review of Reviews.*

INFANTILE ATROPHY.*

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The difficulties attending the treatment of this class of patients is my reason for reporting some of my experiences in the past two years with such babies.

The term "infantile atrophy" is a relative one and no sharp line can be drawn between malnutrition and infantile atrophy. The class of cases, however, which I wish to discuss are the advanced cases of malnutrition, therefore properly termed "infantile atrophy," "marasmus" or "athrepsia infantum" (Parrot). This condition is a vice of nutrition and does not properly include wasting due to syphilis, tuberculosis or diseases of the stomach or intestines.

In the children's ward of the Woman's Hospital in 1907 there were 13 deaths; 8 of these were due directly or indirectly to infantile atrophy. In 1908 there were 18 deaths, 8 of which were due to the same cause. Many of these infants were admitted in advanced stages of atrophy, so that they were practically hopeless cases for institutional care, and yet very proper cases for special care and attention. In other words, one half of the deaths in the children's ward in the past two years have been due to a condition which is largely preventable.

I have the records of 26 cases of infantile atrophy seen in the past two years in private practice and in the children's ward of the Woman's Hospital. I have purposely omitted clinic cases because of the difficulty in following up these cases. All these babies were under one year, with the exception of 2 cases, and most of them were under six months of age. They all gave the history of having been normal at birth. Only 2 cases had been fed at the breast over six months. Most of them had either not had the breast at all or for only a few days or weeks after birth. After that in every case there was a history of trials of different infant foods in rapid succession. Fourteen of these 26 infants died while under my observation, and probably several others of them have since died. Probably about 25 per cent. of them ultimately recovered. It is doubtful whether with our improved methods of artificial feedings our results are any better in

* Read before the Alumnae Association, Woman's Medical College of Pennsylvania, May 27, 1909.

these cases than attended the efforts of physicians twenty-five years ago. Autopsies were made on 3 of the infants who died in the Woman's Hospital. In every case we found the organs nearly normal. All the tissues were pale and anemic in appearance, the stomach and intestines were distended and the walls thin. The liver in 1 case showed fatty degeneration. The mesenteric glands were slightly enlarged in all these cases. The lungs showed some small areas of atelectasis, so that deficient lung expansion would account for the leaden hue so often seen in these cases. One case showed during life the most persistent opisthotonus and marked contractions of both the arms and legs. The postmortem examination was confined to the thorax and abdominal cavity and showed nothing more than above noted.

The etiology of infantile atrophy still remains a mooted question, but the studies and experiments of recent years point to a scanty and incongruous kind of food as the main factor in the production of infantile atrophy. There is a derangement of the gastrointestinal functions which give rise to the processes of fermentation and putrefaction, and these in turn to the formation of organic poisons, especially acids, which are absorbed and poison the organism. Heinrich Stern* calls attention to the fat substances in milk, even in mother's milk, when they occur in abnormal amount, as being frequently the cause of gastrointestinal disturbances. Cow's milk contains about 10 per. cent. of volatile acids. The most important of these fatty acids is butyric acid, which is the mother substance of the acetone bodies, and hence is a food foreign to the infant's alimentary needs, and may be the cause of a number of pathologic affections. Lately Czerny and Keller (Breslau clinic) have suggested a new classification of the disturbances of the nutrition in infancy based on the pathologic chemical processes (for example, fatty injury; starchy food injury; albuminous food injury, etc.). This classification shows the trend of modern investigators to put the blame of this symptom-complex on artificial feeding. Czerny and Keller especially regard a too high fat content as the especial cause of "milk injuries."

Rubner and Heubner have made the first complete investigations of infantile metabolism and conclude that the work of digestion is much more laborious in artificially-fed infants than in breast-fed infants. On this basis Heubner suggests an explana-

* ARCHIVES OF PEDIATRICS, June, 1905.

tion of infantile atrophy. "The work of digestion may be increased in certain infants, so that of the calories introduced so large an amount is required for the work of digestion that not enough remains for the work of assimilation, so the infant wastes." It is a commonly observed clinical fact that artificially-fed infants require more food than breast-fed infants. The bottle-fed infant secretes more urine, as the intake of fluid is greater. The increased peristalsis and the more abundant excretion of urine and feces makes the child restless and it cries more than the breast-fed infant. Bottle-fed babies are nearly always more troublesome and less placid than breast-fed babies. Probably one of the causes of the increase of functional nervous disorders at the present time arises from the fact of the larger proportion of bottle-fed babies, especially among the prosperous classes in the last twenty-five years.

The most important part of the study of infantile atrophy is that which relates to prophylaxis. Babies must not be permitted to develop infantile atrophy. Good breast milk is the strongest safeguard we possess in the prevention of this disorder of infancy. When we consider that nature develops the mammary glands of the mother for their future work while the fetus is developing in the uterus, it is plain that the infant is still part of the mother until its alimentary tract is sufficiently developed to digest other food. The more recent biochemical investigations have shown that milk of one kind of an animal cannot be replaced by the milk of another kind. It has been shown that each organism endeavors to preserve strictly the peculiarities of its species with regard to its cells and body juices. The proteid of a foreign species acts as a poison when introduced into the tissues of the newborn. The adult is able to digest and assimilate foreign proteid, but it acts as an injury to the newborn infant. Moro and Gregor demonstrated the appearance of a leukocytosis after the first administration of cow's milk, whereas breast-fed children in the height of digestion show a leukopenia. A number of recent investigators believe that human milk contains certain ferments or enzymes which are peculiar to it, and which stimulate the activity of the digestive glands. That these views are probably true would seem to be proved by the results obtained by "mixed feedings," when only small quantities of breast milk may be given yet most excellent results obtained. Breast-fed infants also show a greater resistance to infections; this is owing to a higher bactericidal

power in the blood serum of breast-fed babies, as demonstrated by Moro. He showed that even in weak, delicate, breast-fed infants the blood showed greater bactericidal power than the healthy bottle-fed babies.

Another great difference between woman's milk and other milks is that woman's milk is richer in lecithin, which forms a large part of the brain and nerve tissues.

How can we secure for infants the most essential breast milk? We must educate the obstetrician in this most important part of his duty. The only proper stimulus for breast milk is putting the baby frequently to the breast and taking care that the breast is emptied as completely as possible. If the mammary secretion is not established by the second or third day a little sugar-of-milk water should be administered and the baby put to the breast regularly. It is possible for lactation to be established if delayed, even into the second week. As a matter of fact, there are very few women who cannot nurse their infants. But to secure results, nursing must be vigorously insisted upon by the obstetrician. If maternal nursing was generally practiced I believe there would be very few cases of infantile atrophy.

The stools of these infants generally present certain characteristics, which in a measure show the "fat injuries" produced by the food. In infantile atrophy the stools are generally grey or white and quite dry and with a plainly putrid odor. These stools are mainly composed of fatty soaps. We also frequently find fatty diarrheas, when the stools are loose, pale-yellow, and foul smelling; in these fat crystals can be demonstrated. The urine is generally abundant and decomposes rapidly, so that it has a strong ammoniacal odor.

The following is the plan of treatment used in the children's ward at the Woman's Hospital:—

We begin treatment with one or two teaspoonfuls of castor oil. Castor oil is the preferable laxative for these cases. I do not like calomel; it may act as an irritant. If the child has fever, or the stools continue foul smelling, or contain mucus or fatty curds, a colon lavage of normal saline is administered for the purpose of cleansing the mucous membranes and removing the stagnant masses. The infant is then put on cereal-gruel (barley or rice) dextrinized after the method originated by Chapin of New York. To dextrinize the gruel we use a preparation of diastase, known as "Cereo," which is a glycerite of diastase and

especially made for dextrinizing gruels. When Cereo is added to the gruel at a temperature of about 150°F. the gelatinized starch passes into soluble starch and the gruel thins rapidly, and the soluble starch is transferred into dextrines and partly into maltose. These gruels are palatable, easily digested and quite nourishing, and unirritating to the larger bowel. When the stools are no longer putrid and cease to contain mucus, a little milk is cautiously added to these gruels. In these cases the fats and proteids must be kept low, but the child generally can take a rather high percentage of sugar of milk. If the infant vomits the only measure worth mentioning is gavage, which may be repeated daily for a week or two if necessary. Sometimes I add peptonized whole milk or skimmed milk to the gruels. If the stools continue to contain fat curds on the whole milk, it is then skimmed. There are a certain number of cases in which cow's milk howsoever given cannot be tolerated. In these cases condensed milk is often the best thing to start with. It sometimes will be tolerated when everything else fails. Add the condensed milk in one or two teaspoonfuls to the gruel, and then as the infant gains in tolerance add fresh milk or cream to the above. If these cases of marasmus are under five months, every endeavor should be made to supply some breast-milk. Not necessarily a wet nurse, for even one or two nursings of breast milk daily will do wonders. In private practice I have frequently been able to find a nursing woman in the neighborhood of my little patient who will supply one or two feedings daily. We know that all fresh milk contains its own characteristic enzyme. We also know that "enzymes are bodies which are themselves unaffected by the changes which they produce and that their action is continuous." Hence it follows that the effect of mother's milk on account of its ferment is not proportionate to the quantity given. The effect of even very small quantities of mother's milk has been strikingly illustrated by one of my own cases in the past month.

H. R., an emaciated infant of four months, was brought to me as a difficult feeding case. His short history showed that I was the fifth physician who had been asked to find a food which would agree with him. After thoroughly cleansing his alimentary tract by castor oil and high-colon lavage, I began with dextrinized barley water until the "rotten fish odor" of his stools (as his grandmother called it) and the strong ammoniacal odor of his urine had disappeared. Then I began adding condensed milk

to the barley water. Meanwhile we hunted up a woman in the neighborhood who contributed two feedings daily of mother's milk. In a short time the stools were normal and the baby improving, and I began to add fresh cream to the mixture previously given. The child went along so well that his mother, on her own initiative, stopped the mother's milk. After a few days he began to have bad stools again, but his condition had improved so much on his two weeks of breast-milk feeding that he made a rapid recovery to health. In the feeding of marasmic infants over six months of age, I have obtained good results by adding peptonized milk to the barley water. It is generally better to begin with peptonizing the milk thirty minutes, and then gradually reduce the peptonization as the child improves. Also to slowly increase the milk until we give equal parts peptonized milk and barley water. Cow's milk coagulates into solid curds, which cannot readily leave the stomach. Peptonization assists in breaking up the solid curds so that they can pass more readily into the intestines where the principal work of digestion is carried on in the infant.

In the past year we have been afforded an unusual opportunity of using, in the children's ward of the Woman's Hospital, the milk of four goats. This goat's milk came from the "Bryn Clovis" dairy at Malvern and was obtained with the same cleanliness as was used in the preparation of the cow's "certified milk" from the same dairy. Goat's milk has been used for centuries in the feeding of infants, but mostly in isolated cases. I have been able to find very little scientific data concerning the use of goat's milk. The analysis of goat's milk given by Professor Raudnitz* is as follows: "Water, 85.5 per cent.; total solids, 14.5 per cent.; fat, 4.8 per cent.; milk sugar, 2.5 per cent.; casein, 3.8 per cent.; lactalbumin, 1.2 per cent.; total proteids, 4.10 per cent." So that goat's milk has a larger percentage of fat, a lower percentage of sugar, and a higher percentage of proteids than cow's milk. We had a number of analyses of the different goat's milk made at the "Philadelphia Clinical Laboratory," and found the percentages varied a great deal at different times. In other words, we found it impossible to secure, because of the small number of goats in the dairy, a well balanced milk, that is, a milk in which the fats, proteids and sugar would remain about the same. A condition that would be overcome by obtaining milk from a larger dairy.

* "Diseases of Children," Pfaundler and Schlossmann, Vol. I., page 316.

An analysis of four goats' milk after mixing both morning and evening supply gave the following results: Total solids, 11.11 per cent.; proteids, 3.53 per cent.; fats, 3.50 per cent.; lactose, 3.29 per cent., which is considerably below the percentage usually given. One supposed great advantage of goat's milk over cow's milk, as quoted by J. Zahorsky,* is "that goat's milk contained a larger percentage of lactalbumin. As the casein is in about the same proportion and the lactalbumin slightly in excess of cow's milk and the fat slightly higher, the same milk formulæ as used in cow's milk are required, but they must be rather more diluted and more sugar should be added. The mineral salts, especially iron, are higher in goat's than in cow's milk." The goats in the "Bryn Clovis" herd were of Swiss breed, and the milk was used after one week following kidding. The goats were fed by being allowed to pasture, and also given some oats in the stable. Cleanliness was strictly maintained, yet the milk always had a strong odor and the babies to which the milk was given had a goatly smell. We gave the milk to a number of infants suffering from malnutrition and used it in the ward over a space of four to five months. We carefully observed these infants by weighing them twice a week and by daily examination of the stools, but failed to see any advantage in the use of the goat's milk over that obtained by the use of certified cow's milk in cases of malnutrition and marasmus.

My conclusion is, that the reason goat's milk has attained a special reputation in Italy and France is because the goats have been kept nearby to the infants supplied, and hence the milk obtained has been very fresh and free from bacteria.

PANCREATIC CYST IN AN INFANT.—W. H. M. Telling and J. F. Dobson (*British Journal Children's Diseases*, May, 1909). The earliest period of life at which a pancreatic cyst has been recorded was six months. In the author's case (child of nine months of age), the situation in which the cyst presented itself, its mobility, the fact that it could be traced directly to the pancreas, and that it was free from all other structures, made its origin quite certain. The absence of ferments in the fluid has been conclusively shown to be of not infrequent occurrence in certain pancreatic cysts. The child was successfully operated upon.—*Archives of Diagnosis*.

* *St. Louis Medical Review*, 1903, Vol. XLVIII., page 45. Editorial, *ARCHIVES OF PEDIATRICS*, March, 1908, "Goat's Milk for Infant Feeding."

ON THE SO-CALLED "CASEIN MASSES" IN INFANTS' STOOLS.*

BY LUDWIG F. MEYER, M.D.,

Berlin.

AND

JEROME S. LEOPOLD, M.D.,

New York City.

(*A reply to Talbot's article on "Casein Curds in Infants' Stools."*)

In the October, 1909, number of ARCHIVES OF PEDIATRICS, in an article entitled "On the So-called 'Casein Masses' in Infants' Stools," which was based on data that had appeared in the literature and upon our own clinical observations and metabolism experiments, we came to the following conclusions:—

(1) The so-called "Casein Masses" in the stools cannot be considered undigested casein.

(2) The nitrogen of the feces and the nitrogen of the food bear no intimate relation to one another.

(3) The appearance of "casein masses" and even an increased amount of nitrogen in the stools do not point to a disturbance in proteid digestion.

In the December, 1909, number of ARCHIVES OF PEDIATRICS, in an article entitled "Casein Curds in Infants' Stools," Talbot, referring to our article, says: "Closer scrutiny of the evidence from which these conclusions are drawn shows that they are unwarranted."

Talbot maintains that we have not discriminated between the smaller and larger curds, but have classed all curds as "so-called casein masses." Such is not the case however. Talbot has acknowledged, and we agree with him in this respect, that the smaller curds are composed mostly of fat. We have shown that the larger curds, or what Talbot calls "casein curds," cannot be considered casein. Talbot says that there is a large percentage of protein in the large curds, and with this statement we agree, but we are unable to see how Talbot or anyone else has shown that this large percentage of protein comes from the casein in the milk and not from the intestinal secretion.

Because we saw these so-called "casein masses" in the stools of infants that had been given whey (which contains no fat or casein), Talbot says that the whey must have been poorly made, and thus have contained casein, or that the so-called "casein masses" in the stools came from the food which had been given

* From the Stadtlichen Kinderasyl in Berlin. Chief of Clinic, Prof. H. Finkelstein.

days before and which had remained in the *Haustris coli*. Suffice to say, the intestinal tracts of our infants had been evacuated, and we have often seen these so-called "casein masses" in infants' stools on a diet free from casein.

Talbot claims that Finkelstein is wrong when he says that large doses of casein can be given without bad effects. Talbot says that this statement only holds good for healthy babies over six months old. We have been able to demonstrate time and time again that even in very young babies large doses of casein have a curative effect on the severest forms of gastroenteric diseases.

A paper by Finkelstein and Meyer will soon appear which will give the results of observations made on numerous infants under six months of age, which had received a food rich in casein (3 per cent.) and rich in fat and with small amounts of sugar and whey.

Talbot maintains that overfeeding young babies with casein causes both a casein and a fat indigestion. He apparently overlooked the fact that there was no casein or fat indigestion in his cases until large amounts of fats and sugars were substituted for the casein. In other words, he caused a sugar dyspepsia by giving large amounts of sugars to his infants. We suggest that in the future Talbot should not diminish the amount of casein in his feeding, but rather the amount of sugar and whey. By this method he will cure his cases of dyspepsia.

Talbot goes on to say "that it is easy to draw false inferences, if too few observations are made." We have made innumerable metabolism experiments at Finkelstein's Clinic, and have been firmly convinced that the amount of nitrogen in the feces bears no intimate relation to the amount of nitrogen in the food. In one metabolism experiment Talbot has confirmed our numerous results. But he imagines he goes farther when he says that large amounts of casein may cause fat indigestion. In this one experiment Talbot seems utterly to disregard the amount of sugar and salts in his feedings. In infants, whose tolerance for fat is low, we have always seen the tolerance for fat increased if the sugar and whey are reduced and the casein in the feeding increased. This fact clearly shows that casein does not cause a "fat as well as a casein indigestion."

In another experiment we showed that the so-called "casein masses" disappeared from the stools of an infant on buttermilk feeding as soon as the sugar in the buttermilk feeding had been reduced. Against this assertion, Talbot says that our buttermilk

was incorrectly made when "casein masses" appeared in the stools and correctly made when there were no "casein masses" present. Inasmuch as we have made this same observation in very many cases, and inasmuch as we used the same buttermilk all the time, and inasmuch as the so-called "casein masses" only appeared in the stools when there was a larger amount of sugar in the infant's food than the infant could digest, and as these so-called casein masses always disappeared when the sugar was diminished and appeared again when the infant's tolerance for sugar had been overstepped, it is fair to assume that the so-called "casein masses" were due to a sugar indigestion and not to the casein in the food.

We are well aware of the rôle which some writers claim intestinal flora play in gastrointestinal diseases, but this question does not enter into our discussion.

In conclusion, we fail to see how Talbot or anyone else has shown that (1) "there is sufficient clinical and scientific evidence to prove that tough curds are composed principally of casein"; or that (2) "they are due to the imperfect digestion of casein"; or that (3) "an excess of casein in the food may result in a fat as well as a casein indigestion."

THE FAUCIAL TONSILS AND THE TEETH.—Hudson-Makuen (*Journal of American Medical Association*, June 19, 1909) observes that the faucial tonsils and the teeth are in close approximation and they are alike subject to disease or degeneration. Diseased tonsils and teeth are locally and systematically unhygienic. Secretions from the tonsils may infect the teeth, and vice versa, the tonsils may be infected by the teeth. Diseased tonsils and teeth cause headache, earache and facial neuralgia, and they become a direct source of infection to the glands of the neck and through the efferent lymphatics to the general respiratory and circulatory systems. Hypertrophied faucial tonsils often become so large as to affect the hearing, the circulation of blood, the nerve supply of the face and head, and the normal development of the alveolar arches. The teeth serve important purposes, but the exact function of the tonsil has not yet been demonstrated. The importance of preserving the teeth is fully recognized, but the diseased tonsil is not worth preserving, because it has lost its usefulness and become a menace to the human economy. The only rational remedy for diseased faucial tonsils is total extirpation.—*New York Medical Journal*.

AN APPARATUS FOR THE COLLECTION OF FECES AND URINE FROM INFANT GIRLS.

BY H. J. GERSTENBERGER, M.D.,

Medical Director of the Babies' Dispensary of Cleveland.

In an article in the *Archiv. für Kinderhk.*, Bd. 48, p. 402, in which Schabad discusses practically all of the various apparatus advocated for the separate collection of feces and urine in infants and in which he presents an apparatus prepared according to his own ideas, he remarks that all the existing devices were constructed only for boys, and that the problem of finding an efficient one for girls still remained unsolved. The writer soon subscribed to the latter statement, as he tried to find an apparatus for collecting the urine and feces of a girl of fourteen months. All attempts to prepare an apparatus which would sit over the vulva and adhere so snugly to the perineum, as to prevent the escape of any urine, failed. As the case was one of great interest, a prolonged infantal tetany in a girl of fourteen months, and as he much desired to do a calcium balance in this case, work continued with a result that, with much aid from Miss Patten, head nurse of the Children's Ward at Lakeside Hospital, and that from Dr. J. McLaughlin, resident physician to Lakeside Hospital, to both of whom full credit and thanks are here given, the following apparatus was constructed, which, in this case at least, gave satisfactory service. It can, however, be used in only a limited number of cases, but as heretofore no apparatus was known for any case, it is considered justifiable to publish a description of it.

The cases for which it can be used are such as have a firm, rather hard and dry stool which would not give off, by a possible rapid wetting by urine, any of the substances that are forming the basis of experiment. Such was the case in our patient, who had a hard, dry, "Fettnarhrs Schaden" stool and in whom a calcium balance was made.

The arrangement of the bed with pillows, as suggested by Schabad, was not carried out, as the pillows gave too much under the weight of our patient, and so made a solid basis for the collecting can impossible.

The following arrangement was found to give a firm dependable bed. Two boxes were placed upon the springs of a bed in such a manner as to leave just enough space between to permit of the placing of the collecting can, which rested on a smaller box of

such a height as to bring the top of the collecting can to the level of the top of the two larger boxes. Upon the collecting can an inflated rubber ring was placed. A Bradford frame was covered by two pieces of tightly stretched canvas in such a manner as to leave an open space, at about the centre, just large enough to give plenty of room for the placing of the buttocks of the patient upon the rubber ring. The Bradford frame rested upon two sand bags, one at the foot end and the other at the head end of the bed, and these again were put upon the larger boxes. These sand bags were just thick enough to bring the Bradford frame just a little above the top of the inflated rubber ring, in order to have the

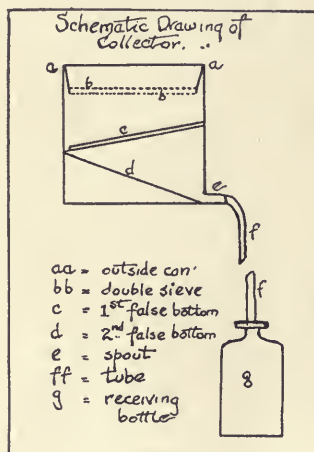


FIG. 1.

buttocks of the patient sink slightly into the centre of the inflated ring. By pinning the well-fitting nightgown of the child, at about the shoulders, to the Bradford frame, and by attaching a cloth cuff to the ankles of the patient, and by pinning this or tying it loosely to the lower end of the frame, it is possible to keep the child, without discomfort, in a position that will make the complete collection of feces and urine possible. If the child is very unruly the frame can be easily tied down to the firm sides of the bed in order to prevent the tipping over of the child.

The collecting can is a round heavily tinned dish, that is from $6\frac{1}{2}$ to $7\frac{1}{2}$ inches in diameter, and 5 inches high. The bottom of the can is flat; but it contains also two so-called false bottoms (see Fig. 1), the upper one of which is removable. This is a piece of heavily tinned material whose edges are turned up to the height of one-quarter of an inch, except for one-half inch at its lowest point. The turning up of the edges along the side is to force everything coming through the sieve resting in the opening of the can, to pass out through the inch and a half wide space at its lowest point, to the firm false bottom immediately below it running in the opposite direction. The upper false bottom rests upon a circular projection created by forcing a groove in the outer surface of the can. Each false bottom has a drop of about three-quarters

of an inch. At the lowest point of the firm or lower false bottom is a one-half inch wide opening, running out into a connecting tip to which the rubber hose is attached which passes into a bottle beneath the bed. In the opening of the collecting can two rather finely meshed, well-fitting sieves are placed to prevent the feces from dropping into the can beneath. It is necessary that the can be inspected at least once an hour, in order to prevent the unnec-



FIG. 2.—Showing child in position on Bradford frame, the buttocks supported by and projecting into the lumen of the inflated rubber ring, below which is the collecting can and rubber tube leading to bottle beneath bed.

essary wetting with urine of any feces that might have, since the last inspection, fallen into the sieves. The relative positions of boxes, frames, can, etc., can be well seen in the accompanying photograph.

INTESTINAL WORMS AND APPENDICITIS.—F. D. Donoghue (*Ann. Gyn. Ped.*, June, 1909) records the case of a girl of twelve years, with no history of previous intestinal trouble, who had had abdominal pain for six hours. She had localized pain and muscular spasm, a pulse of 100 and temperature 104.6°F. The appendix showed no marked gross lesion, but was removed. When opened, its lumen was found to contain several small fecal concretions about which were clumped pin-worms.

CASE OF TRAUMATIC ESOPHAGEAL STRICTURE IN A TWO-YEAR-OLD CHILD, WITH RADIOGRAPH.*

BY GEO. W. ROSS, M.D.,
Port Ewen, N. Y.

Cicatricial strictures are commonly a late effect of swallowing caustic fluids, which produces a sloughing surface followed by the formation of scar tissue. The gradual condensation, or contraction, of the scar produces a stenosis. Weeks, and even months in some cases, may elapse before the obstruction appears.

The following case is of sufficient interest to report on account of the diagnosis of the location of the stricture and the rapid recovery:—

C. E., female, aged two years. Her present illness dates from June 25, 1909. While playing with some other children making mud-pies, she was sent to get some water with which to continue the pie making. Finding a tin can which had contained Babbitt's lye, she filled it with water and returned with it to the other children. After using some of the water the can was set aside. Our little patient being thirsty drank this water, now thoroughly saturated with the lye which had been left in the can. The solution was so strong that it burned her mouth and lips as well as the esophagus and the stomach.

A physician was called who attended the patient about ten days, her condition being apparently much improved.

On July 10th, sixteen days after the accident, I was called to see the little girl, who was now unable to swallow anything whatever. She would take one or two mouths full of milk or water which she would swallow, thus filling the already dilated esophagus to the stricture, and then she would regurgitate it. There were signs of considerable emaciation and she was very weak.

Finding I had a stricture of the esophagus which might prove to be impenetrable the patient was taken to the Albany Hospital, where at first it was impossible to pass even the smallest bougie. Following suggestions of Dr. H. L. K. Shaw, that the X-ray might be of value in this case, Dr. Holding, who has charge of the X-ray work at the hospital, took the picture.

With the patient under the influence of chloroform a stomach

* Read before the Third District Branch of the State Medical Society of the State of New York at Hudson, N. Y., October 5, 1909.

tube was inserted as far as possible into the esophagus and then a thick watery solution of subnitrate of bismuth was forced in as the tube was gradually withdrawn. The picture was then taken.

The picture will show for itself the value of the X-ray in these cases as it gives precisely the location of the stricture, the dilatation of the esophagus above it, and the gradual tapering of the esophagus to a point below.



X-ray photograph showing the dark shadow due to the bismuth in the esophagus, indicating the point of stricture and the dilatation of the esophagus above.

After the above procedure it was possible to pass a small bougie. Following this, bougies of gradually increasing sizes have been passed at first every day, later every two or three days, until now I am passing a No. 26, once a week.

The patient is now able to swallow very well; has gained considerable in weight and is doing very well.

EDITORIAL NOTE.

A REVIEW OF RECENT EXPERIMENTAL WORK UPON ACUTE POLIOMYELITIS.

Until very recently the outlook for an experimental study of acute poliomyelitis seemed most unpromising. In spite of the fact that frequent epidemics gave ample opportunity for a thorough investigation of this disease, and that its ravages encompassed almost the entire civilized world and counted its victims by the thousands, no footing could be obtained as a basis for laboratory study. The exciting agent of this disease was zealously sought in the various secretions and excretions of the body; in the cerebrospinal fluid, in the blood, and largely also in the stools of the unfortunate victims of the scourge. But all to no avail; the work of individuals and of commissions proved fruitless. No parasite nor microorganism could be consistently isolated as the inciting agent, nor could the disease be reproduced in any of the lower animals.

Coming at a time when the outlook was so obscured, the work of Landsteiner and Popper may be regarded as ushering in a new era in the scientific study of acute poliomyelitis. In the spring of 1909 Landsteiner and his associate published an article on the "Transmission of Acute Poliomyelitis to Apes," showing that if the spinal cord of a patient dying of this disease was injected intraperitoneally into monkeys, these animals, after a brief period of incubation, developed paralysis which was found to be the result of typical changes in the cells of the spinal cord. These workers were unable to transmit the disease from monkey to monkey, nor were they able to isolate its virus, which they considered to belong to the class of invisible protozoa. This pioneer work was soon confirmed, although not extended, by Knoepfelmacher abroad and by Strauss in this country. It was not long, however, before a step in advance was made by Flexner, who by the use of intracerebral instead of intra-abdominal inoculations of the spinal cord tissue, was able to transmit the disease through a series of monkeys and definitely establish the infectious nature of the virus. From a purely scientific point of view it is interesting and instructive to note how vigorously the work in this field was pursued as soon as fruitful soil was opened. Within a few days of Flexner's important contribution, Roemer, of the Marburg Laboratory, reported the effective transmission of the disease from monkey to monkey, and Leiner and Wiesner, of Vienna, re-

ported similar successes. Hardly a week had elapsed, when, in turn, Landsteiner and Levaditi announced that experiments conducted at the Pasteur Institute showed that not only was the virus capable of being transmitted through a series of monkeys, but that it was so minute as to be able to pass through the finest filter. Thus at one and the same time, now that a means had been demonstrated of studying this disease, workers were busied with this theme in the laboratories of France, America, Germany and Austria.

It would lead us too far afield to detail the many interesting facts which have been brought out here and abroad in the course of this work. It seems certain, however, that additional facts in relation to the etiology, the pathogenesis, and perhaps even the treatment of acute poliomyelitis will be discovered. This sudden vivifying of a dead scientific problem shows how important are methods of technic in experimental work, how they count for success or failure. It also shows us the value and necessity of animal experimentation in the study and solution of the diseases which afflict mankind.

THE CAUSE OF DUODENAL ATRESIA.

BROOKLYN, N. Y., February 8, 1910.

TO THE EDITOR OF THE ARCHIVES OF PEDIATRICS:

Dear Sir:

In the January issue Dr. Freeman reported an interesting case of duodenal atresia and gave some statistics in regard to this rare malformation. He states that the cause is unknown, which is somewhat misleading. The more carefully we study embryology the more we shall be convinced that all congenital abnormalities are due to the persistence of conditions which are normal at some period of fetal development.

In embryos of about 12 *mm.*, that is, at about the fifth week of gestation, there is a period at which the duodenum is temporarily completely obliterated during the time that the hepatic and pancreatic ducts are forming. It is the abnormal persistence of this normal condition of the duodenum that accounts for congenital duodenal stenosis and atresia.

Yours truly,

LOUIS C. AGER.

SOCIETY REPORTS.

THE NEW YORK ACADEMY OF MEDICINE.—SECTION ON PEDIATRICS.

Stated Meeting, held January 26, 1910.

THE PRESIDENT, DR. JOHN A. WYETH, IN THE CHAIR.

This meeting was held under the auspices of the Section on Pediatrics.

EXPERIMENTAL EPIDEMIC POLIOMYELITIS AND ITS BEARING ON EPI- DEMIC POLIOMYELITIS IN MAN.

DRS. SIMON FLEXNER and PAUL A. LEWIS presented this communication. (See page 93.)

DR. L. EMMETT HOLT, referring to the clinical features of the disease as it appeared in the epidemic of 1907, stated that they were absolutely identical in symptomatology with those described by Dr. Lewis as occurring in monkeys. The etiology of poliomyelitis was a great puzzle. Small epidemics appeared in widely scattered areas, appearing quickly and disappearing as abruptly as they came. Two years ago, in an attempt to collect data of the various epidemics that had appeared previous to the one of 1907, he was able to learn of but 35, and most of these were small epidemics, the reports of which in many instances were poor. Since that year more epidemics had been observed than in all previous time. An interesting question in regard to this new aspect of this disease was that of its frequency; was it more frequent now than formerly, or was it only more frequently recognized? Again, was epidemic poliomyelitis as it appeared to-day different from the sporadic form from the study of which our previous knowledge was obtained? Dr. Holt said that he was not at all certain that the differentiation was well defined between the sporadic and epidemic forms of the disease. He thought, however, that there had been much confusion in the diagnosis made and also that there had been a great and alarming increase in

frequency, but he was not certain that the disease had changed its character. Was Landry's paralysis only a more serious form of the disease, but hitherto not identified as such? So, at least, it now appeared to be. Dr. Holt wished to point out the necessity for more clinical research in poliomyelitis; much work should be done by those who saw the cases, especially in country cases where the association of cases could be determined with some degree of certainty. He called attention to the work the Massachusetts Health Department was doing; every case of poliomyelitis reported to it was investigated. To his own knowledge several epidemics of poliomyelitis had occurred in New York State during the past year. The State Board of Health should recognize poliomyelitis as one of the epidemic diseases and investigate its occurrence wherever it prevailed. The infectious nature of poliomyelitis had been believed in for five or six years. Dr. Flexner's researches had now demonstrated that this belief was correct. Was this disease also contagious? This was a matter about which they could not be certain, but the results of experiments as well as clinical observations pointed strongly in that direction. Dr. Holt referred to one instance in literature in which 7 cases of the disease occurred in one family; five instances in which 3 were affected; three instances in which 4 cases occurred in one family; forty in which 2 were attacked. In 37 of the cases mentioned the interval between the first and second cases was ten days or less. One might infer that the period of incubation was the same as had been found experimentally in monkeys. Further study of poliomyelitis, both clinical and experimental, could now be based upon definite established scientific facts, and it was to be hoped that future investigation of the disease would bring some tangible, practical results.

THE CONDITIONS PERTAINING TO THE SAFEGUARDING OF EARLY
LIFE FROM A PEDIATRIC POINT OF VIEW.

DR. THOMAS MORGAN ROTCH, of Boston, read this paper, which he illustrated by lantern slides. He first reviewed the work which he had already done on the establishment of an anatomic index representing the development of children in the first thirteen years of life, and he showed Roentgen pictures of their wrists. He then showed pictures of children taken from the elementary schools, and gave their heights, weights, school grade, age and

anatomic index. An analysis of these data showed how with a high or low anatomic index, as compared with their age, the children could be graded so as to determine whether they were being forced beyond their resisting powers or, on the other hand, if they could if necessary be pushed into a higher grade. Dr. Rotch also explained how important it was to determine the time when children should work in the mills, not by age alone but by a combination of educational standards and age regulated by reference to the anatomic index as obtained by the Roentgen ray. Illustrations were shown of some of the Southern children who were infected with the hookworm, looking as though they were years younger than they really were and who, by means of their index, could, if proper laws of development were made, be prevented from working in the mills, even though their age was far above that presented by the laws. Dr. Rotch then spoke of the Roentgen work which, at the request of the United States Government, he was having carried out at the United States Naval Academy for the purpose of aiding in the proper grading of the cadets. He showed how, with this object in view, he was using the Roentgen ray to determine an anatomic index for older individuals at an age when they were in the Naval Academy, college, technical and high schools. He stated that while his Roentgen index had been determined for individuals from one to thirteen years by the order of appearances of the carpal bones and the epiphyses of the radius and ulna, from A to M, he was now presenting merely the lines on which he was evolving the later age anatomic developmental indices. He wished it to be understood that this later index was still merely empirical and not yet worked out as fully as the earlier index, but that there was no doubt but that this later index, from N to Z, could be evolved just as rationally as the earlier one, from A to M. The method of establishing the later index was to determine the time and thus classify the individual by tabulating in each individual the appearance of the ossification or later union of the epiphyses of the metacarpal bones, the epiphyses of the phalanges and those of the radius and ulna. He explained that this was not difficult from the age of fourteen up to eighteen or nineteen years, but that after that period much finer Roentgen work would be needed to determine the completion of development by the arrangement of the stria in the bones at their epiphyseal junctions. Dr. Rotch then showed illustrations of how the Roentgen picture would aid

in deciding whether girls at the period of maturity should have their mental and physical work increased or decreased according as their anatomic index showed an advanced vigorous stage of development or an undeveloped condition irrespective of whether they looked well and were of the average height and weight. He next showed the Roentgen pictures of a set of boys who had entered college at eleven or twelve years of age and were doing the same mental work as boys four or five years older. He explained how their anatomic index indicated whether they were safely undertaking this work beyond their years or not. In some cases the index showed that the individual was absolutely safe in doing such work. One of these cases was a boy of fifteen who had been through college and had taken a *cum laude* and was in one of the post-graduate courses with young men of twenty-two. Although seven years younger than his classmates, his anatomic index showed a development so nearly that of the other individuals that there was evidently no question of his being harmed mentally. Other cases showed the reverse of these conditions. Dr. Rotch also presented the beginnings of some work that he had undertaken on feeble-minded children. Here he had found that such individuals might be of the same height and weight as others of their years and yet their anatomic index corresponded more nearly to their low grade of mental capacity than to their general physical development. He also gave instances of how, from time to time, by taking the Roentgen anatomic index it was possible to determine whether the mental capacity was improving or standing still, this in private practice was often an exceedingly difficult question to answer, unless some such aid as the Roentgen ray was invoked. Finally, he showed the Roentgenographs of some twins in which two girl twins showed exactly the same development. Two boy twins also showed the same development, but a twin boy and girl showed that the development of the girl was decidedly in advance of the boy. Dr. Rotch stated that these cases supported his view that from birth the development of the epiphyses of the girls was decidedly in advance of the boys and that they continued so throughout the whole of the child's life, the final union taking place earlier in girls than in boys. Some Roentgenographs of children infected by the hookworm were presented showing the anatomy of development in these cases and their low anatomic index.

THE PHILADELPHIA PEDIATRIC SOCIETY.

Meeting of January 11, 1910.

J. CLAXTON GITTINGS, M.D., PRESIDENT.

PAROXYSMAL HEMOGLOBINURIA.

DR. HOWARD CHILDS CARPENTER showed a girl of six years, with paroxysmal hemoglobinuria. This is the second winter she has had attacks, which are brought on by exposure to cold. The attacks are typical, consisting of a distinct chill followed by fever, sweating around the head and the immediate passage of urine containing a large amount of hemoglobin. She usually has about one attack a week, but during the summer she remained free from paroxysms.

DR. EMERY MARVEL said that it is difficult to fully reconcile one's convictions to the fact that every case of hemoglobinuria is a disease entity. It seems more plausible to think of the hemoglobin in the urine as being due to some different exciting cause, that it is the expression of some underlying condition. One naturally thinks of calculus or hydronephroma with the history given by Dr. Carpenter. Dr. Marvel then asked what investigations had been made to eliminate these conditions; whether there had been an X-ray examination, and whether at any time during the recurrences there had been enlargement of the kidney?

DR. CARPENTER answered that two X-ray photographs had been made in this case, both of which failed to show either any calculus or enlargement of the kidney. Very few red blood corpuscles were found in the urine at any time.

INTERSTITIAL PNEUMONIA.

DR. J. CLAXTON GITTINGS showed a boy of nine years, in whom the diagnosis had been made by exclusion. Six years before he had had measles, followed by pneumonia, since which time

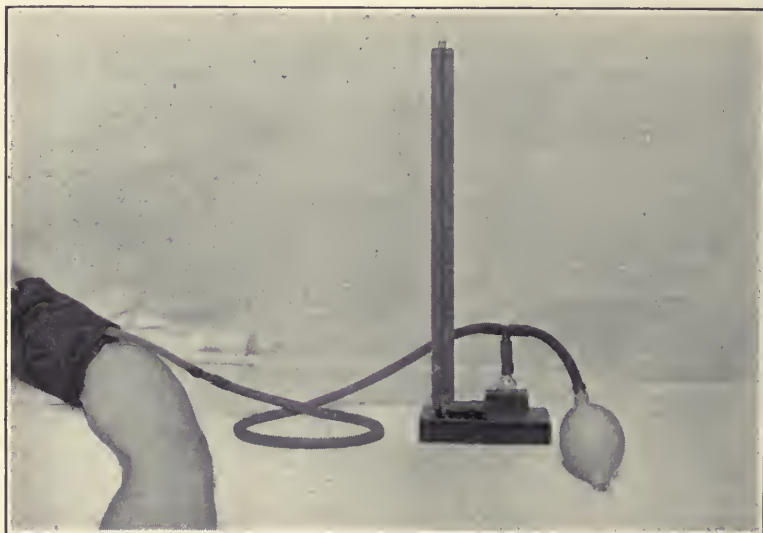
cough, with more or less sputum, has been continuous, most in winter, least in summer. Two years ago the percussion note over the entire left lung was dull, breath sounds were somewhat muffled and moist râles were heard. To-day percussion gives dull tympany and expiration is slightly prolonged but soft, suggesting emphysema; over the right upper lobe there is also slightly impaired resonance. Fine moist râles are heard over both areas. No signs of cavity or of bronchiectasis can be demonstrated, though the sputum is at times profuse and offensive. His chest is of the "chicken-breasted" type. There are no sweats. Evening temperature rarely exceeds normal. Sputum examinations have always failed to show tubercle bacilli. The boy looks well, having slowly gained in weight, in spite of his poor hygiene and diet, which remains mainly tea, coffee and fresh bread. Although a tuberculous implantation is to be expected, it is impossible to conceive that the tubercle bacillus is the cause of the widespread lesions which have existed so long. No X-ray examination was ever made.

DR. A. H. DAVISON said that he thought the boy much better than he was some years ago. He had not considered the condition tuberculous at any time.

NEW AND SIMPLE BLOOD PRESSURE APPARATUS.

DR. DELNO E. KERCHER, by invitation, showed a very simple apparatus, consisting of but three parts; a base bearing a glass mercury cistern connected to an upright glass tube lying on a 300 mm. scale for measuring the height of the mercury column; a strong cuff of cloth, 4x36 inches, with rubber pneumatic tube in one end; and a rubber bulb with double valves and three feet of tubing with connections for attaching to cuff and cistern. It is inexpensive, as there are no ground joints, valves, cocks or expensive construction on it. It is very easy to manipulate, as follows: The stand with scale attached is placed near the arm to be tested, the scale having first been adjusted so the zero line will be at the level of the mercury in the column. The cuff is wound around the arm above the elbow, taking pains to have the pneumatic bag cover well the brachial artery. The cuff is fastened by tucking the free end under the previous turns. The connection in the end of the rubber tubing is now attached to the tubing com-

ing from the cuff; the T connection is slipped over the top of the cistern. The operator now takes the rubber bulb in one hand in such a manner that the tubing leading to the cistern is readily grasped between the thumb and forefinger. The fingers of the other hand are free to be applied to the pulse or to manipulate the stethoscope, depending on which method one uses. Air is pumped into the cuff until the pulse is obliterated. The escape of this air is controlled by the pressure of the finger and thumb on the rubber



DR. KERCHER'S BLOOD PRESSURE APPARATUS ASSEMBLED
READY FOR USE.

tubing. The point on the scale at which the mercury stands when the pulse first reappears is the measure of the systolic pressure. The air is allowed to escape slowly, noting the point on the scale at which the greatest oscillation of the mercury column occurs. This gives the diastolic pressure. By removing the scale and cistern from the base, inserting corks in the top of cistern and column, this apparatus can be put into any convenient bag and readily carried about. It weighs 14 ounces.

DR. GITTINGS considered that this manometer fills a long-felt want of the general practitioner for a practical instrument at low cost.

NON-SPECIFIC ACUTE INFECTIONS IN YOUNG CHILDREN.

DR. HERBERT FOX reported 22 cases of non-specific infections, by which term he means not diphtheria, measles, epidemic meningitis, scarlatina, tuberculosis and the like. Nor has he included infections of the gastrointestinal tract. The cases were all children under ten years, and all but three under six years. In these cases, 11 of which were bronchopneumonia, Dr. Fox described the bacteriologic findings in detail.

In concluding Dr. Fox said that the cases showed that streptococcus and pseudodiphtheria bacilli were very frequently present and responsible, the former more often than any other organism.

DR. HERMAN B. ALLYN said that bronchopneumonia was serious for several reasons. It attacks, for the most part, children under five years of age, in whom resistance is abnormally low; it is especially prone to follow the infectious diseases of childhood, and may often be the cause of death. Not only is the disease dangerous to the small patient, but it is very wearing on the physician, as in no condition is it more difficult to make a definite statement as to duration and result. One of those cases of bronchopneumonia included on Dr. Fox's list had a peculiar temperature chart, going from normal at seven or eight o'clock to the maximum, 100° to 103° F., by eleven o'clock each morning, gradually declining by night, when the child slept well. This forenoon rise may have been due to the hard and exhausting coughing which followed waking. In sending the specimens to Dr. Fox, Dr. Allyn had hoped that some specific microorganism might be constantly found; in this he was apparently mistaken. It seems generally to be a mixed infection. He added that it was often wise to change the patient from one room for several hours every day, either to another, cool room, or to out of doors. He finally called attention to the importance of keeping the mouth clean.

DR. W. M. L. COPLIN spoke of the problem of succeeding infections in bronchopneumonia. One infection appears to follow the other, several different infections often being found simultaneously, as the disease progresses. This makes the outlook for vaccine therapy most discouraging; though any one strain may be combated, the susceptibility to infection remains and other microorganisms thrive. Dr. Coplin hesitated to discuss the relation between the bacteria of the pharynx and those found in infections of the trachea, bronchi and lungs. There does not appear to be any

necessary connection between the flora of the pharynx and that of the trachea, and consequently deductions from sputum examinations might be very misleading. Agonal infections which may appear suddenly and spread quite actively are frequently caused by most rapidly growing bacteria and almost if not quite invariably are present in fatal cases; such facts render the results of post-mortem bacteriologic examination also of doubtful value.

DR. GITTINGS thought that one feature of the protracted cases of bronchopneumonia which is of such importance was the difficulty in determining the onset of empyema. In some of these, exploratory puncture must be attempted several times before fluid is found. In private practice the objection to this procedure at times puts the physician at a distinct disadvantage. In view of the inefficacy of treatment, it is greatly to be hoped that vaccine therapy may prove to be of real value.

DR. FOX added that vaccine therapy had better be let alone, in bronchopneumonia until we know more about vaccine treatment of children and the bacterial cause of the disease. Bronchopneumonia may be a general instead of a local infection and in that case should not a blood culture be made early in every case?

DR. GITTINGS then delivered the annual presidential address.

RESULTS IN CEREBROSPINAL MENINGITIS.—Leo Cohn (*Berlin. klin. Woch.*, January 11, 1909) says that of all forms of meningitis the cerebrospinal form gives the best prognosis. The mortality varies from 20 to 80 per cent. in various epidemics. After observing the epidemics of 1905, 1906 and 1907 he gives some general conclusions. All the cases were diagnostically confirmed by the finding of the meningococcus of Weichselbaum. In mild cases a complete cure is obtained. In severer ones, and even in the most severe type of cases, a cure without any physical symptoms may be obtained. Some appear cured at first, and yet the effects of the disease appear in from two to two and a half years. Four weeks after convalescence is established we may fear the appearance of hydrocephalus. The complication most to be feared is deafness. While paralyses and optic nerve affections may disappear, deafness is generally irreparable. Agglutination of the blood serum with the meningococcus was noted in 2 cases more than a year after recovery.—*American Journal of Obstetrics.*

CURRENT LITERATURE.

ABSTRACTS IN THIS NUMBER BY

DR. T. WOOD CLARKE.	DR. FRITZ B. TALBOT.
DR. SAMUEL FELDSTEIN.	DR. G. R. PISEK.
DR. L. E. LA FÉTRA.	DR. M. C. PEASE, JR.
DR. C. D. MARTINETTI.	DR. M. NICOLL, JR.

DISEASES OF THE EYE.

WEILL, E., AND MOURIQUAND, G.: DIPHTHERITIC CONJUNCTIVITIS FOLLOWING MEASLES. (*Archives de Médecine des Enfants*, February, 1909, p. 81.)

The authors report 5 cases seen in their clinic at Lyons, and after a consideration of the literature and of their own observations, they give the following conclusions:—

(1) In addition to ordinary diphtheritic conjunctivitis arising in the course of diphtheria, or even without that disease, and since serum therapy, considered a relatively benign affection, there exists a form of diphtheritic conjunctivitis which is always serious and very often fatal.

(2) This diphtheritic conjunctivitis may appear either in the course of measles or after the termination of the eruption. It may be preceded by absolutely no other diphtheritic manifestations and its development is rapid.

(3) Clinically, this form is marked by severe edema of the eyelids, which often attain the size of an egg; also, by the development of false membrane upon the conjunctiva of the lids and eyeballs and by infiltration, ulceration and early perforation of the cornea.

(4) In regard to prognosis, it is important to consider two forms of diphtheritic conjunctivitis following measles:—

(a) The late form arises ten, fifteen or thirty days after the end of the eruption. It often attacks the cornea, which it may ulcerate and sometimes perforate, but it is rarely fatal. Normal healing takes place in about 30 per cent. of the cases. Serum therapy has little effect upon the progress of the disease.

(b) The early form is that which the authors are particularly anxious to describe. It appears generally during the height of the eruption or at its decline, and it shows the maximum characteristics of the disease above described. It is marked above all by its steady progress toward perforation of the cornea and a fatal issue, and by its constant and absolute resistance to all treatment, whether by serum or otherwise.

L. E. LA FÉTRA.

DISEASES OF EAR, NOSE AND THROAT.

ARMAND-DELILLE: SYMPTOMES ASPHYXIQUES, PROVOQUÉS PAR L'INSTILLATION NASALE D'HUILE MENTHOLÉE CHEZ UN NOURISSON. (*Annales de Med. et Chir. Infantiles*, May 1, 1909, p. 302.)

The writer reports a case of a baby which had typical spasm of the glottis and stenosis lasting about fifty seconds, immediately after 2 per cent. mentholated oil was dropped into its nose.

Fritz B. Talbot.

STEWART, CHARLES M.: TONSILS AND ADENOIDS. (*Montreal Medical Journal*, December, 1909, p. 781.)

Dr. Stewart's paper is founded on the experience of 7,000 cases. His indications for the removal of tonsils is as follows:—

(1) Occasionally, only on account of their enormous size. Their presence interferes with respiration and deglutition to such an extent as to be a serious hindrance to health, besides which the crypts become filled with septic material and quinsy or some variety of tonsillitis occasionally develops.

(2) Septic tonsils (acute and chronic) have a close relationship to rheumatism, chorea, and endocarditis. These tonsils must be enucleated, as slicing off a piece of the tonsil is worse than useless.

(3) Children with enlarged tonsils and adenoids are very prone to contract scarlet fever and diphtheria if they are exposed to the specific virus; and in these cases acute suppuration of the middle ear is almost sure to occur during the course of the disease.

(4) It is doubtful whether the removal of adenoid has ever cured enuresis.

(5) No treatment of chronic suppuration of the middle ear is likely to effect a permanent cure if enlarged tonsils and adenoids are present. Chronic middle ear catarrh is much relieved by the removal of enlarged tonsils and adenoids, as in this way the tendency to rhinitis and colds in the head is much lessened with a consequent decrease of tubal congestion.

Anesthetic.—Gas or gas and oxygen does nicely, or chloroform and ether, equal parts by weight. Ether is the safest. Chlorid of ethyl for this operation is not good, as it is unsafe, and also congests the head and neck. A general anesthetic is, as a rule, to be preferred to a local anesthetic.

Dr. Stewart gives a brief discussion of hemorrhage, septi-

cemia and pyemia, conditions which occasionally follow this operation. He is probably correct when he says that "no operation in surgery is so abused by the unskilled and also unnecessary removal of tonsils and adenoids. But when properly done and in suitable cases the results are most satisfactory. The child's intellect, hearing and bodily welfare are preserved."

M. C. PEASE, JR.

RICHARDS, GEORGE L.: THE PRESENT STATUS OF THE TONSIL OPERATION. A COLLECTIVE INVESTIGATION. (*Medical Record*, December 11, 1909, p. 975.)

Dr. Richards draws the following conclusions:—

(1) Further study of the physiology of the tonsil seems desirable, as it is still somewhat of a question as to how much importance the tonsil may be at certain periods of life, and if of value in the economy, it ought not to be removed to as great an extent as at present.

(2) Under diseased conditions, the tonsil is one of the avenues of entrance for the tubercle bacillus and for the specific organism of rheumatism, whatever that may be. There is a sufficient amount of undoubted clinical evidence to show that it is also the avenue from which the infection enters for many other constitutional diseases.

(3) The small submerged tonsil is quite as apt to be deleterious to the economy as the large one.

(4) Local measures in the treatment of tonsillar troubles have their place.

(5) The indication for removal is any condition in which it is evident that the tonsil is exerting an injurious influence upon the entire organism which cannot be averted by local treatment.

(6) Ether is the safest anesthetic.

(7) According to the testimony of most observers, some form of horizontal position is the safest for general anesthesia, though the writer believes that the upright position, properly safeguarded, is equally safe.

(8) Tonsillectomy should always be done in preference to tonsillotomy. Any method that removes the tonsil *in toto*, with its capsule, with the least traumatism, is satisfactory.

(9) The voice is improved rather than injured, provided the pillars of the fauces are uninjured in the operation.

M. C. PEASE, JR.

DISEASES OF THE SKIN.

HUTINEL, V., AND RIVET, LUCIEN: SERIOUS SEPTICEMIA AS A COMPLICATION OF SKIN AFFECTIONS IN YOUNG CHILDREN. (*Archives de Médecine des Enfants*, January, 1909, p. 1.)

The prejudice against curing affections of the skin is one that is deep rooted, and this fear of the disease "striking in" has some basis in the knowledge that occasionally sudden death occurs in the course of eczema and impetigo. The authors report in detail 8 cases; 5 of these were fatal, death being accompanied by hyperpyrexia. The other 3 were cured.

The usual history of the cases is as follows: A large fat infant, usually less than a year old, with patches of eczema on the face, scalp and body, is brought to the hospital and isolated as well as possible in a crowded ward. Notwithstanding that no one is allowed to touch the eczema without most careful aseptic precautions, the child's temperature rises rapidly during the following night, or perhaps after one to six days, to 103° or 104° F.; the infant becomes pale and the redness of the eczema disappears. The respiration becomes short and irregular; the pulse very rapid and irregular; convulsions come on and death supervenes after some hours of hyperpyrexia upon which baths have very slight effect.

The serious symptoms came on in all cases either before treatment had been instituted or before it had had any appreciative effect on the eczema. Contrary to what occurred in the case of Boulloche and Grenet, there was no recession of the eczema in any of the cases observed, since the lessening of the redness was not accompanied by any diminution of the infiltration. At the time of the high temperature there may be severe diarrhea or there may follow bronchopneumonia, suppurative otitis or cutaneous abscesses. The age of the infants is of prognostic influence; the 3 that were cured were fourteen, twenty and twenty-four months old; the 5 that died were nearly all under ten months.

One is not justified in making a class of eczema cases in which there is sudden death accompanied by fever and by diverse lesions of the viscera, and a class of impetigo cases with sudden death and no fever nor discoverable lesions. Late effects are lymphatism, anemia, bronchopneumonia, nephritis, meningitis and arthritis.

Various theories have been proposed to explain the sudden

death or the severe symptoms in these cases—metastasis, toxemia, status lymphaticus and myocarditis—but all these lack proof. The authors believe in the infectious origin of the condition. In 8 cases in which blood cultures were made, 1 case showed staphylococci aureus, 5 showed diplostreptococci, and in only 2 was there no growth. In 2 of the positive cases the streptococci were found during life. In future, blood cultures should be made both in aerobic and anaerobic media, since in the last case studied the septicemia was discovered to be due to a streptococcus only by anaerobic cultures.

The authors think that the air of the hospital ward, the bath, the clothing, or the nurse's hands infect the minute open wounds of the eczematous skin, resulting in septicemia in the younger infants, and in cutaneous suppurations in the older infants. The authors would explain the special susceptibility of certain infants as due to a condition of anaphylaxis.

L. E. LA FÉTRA.

PATHOLOGY.

GREGG: ACUTE TRICHINIASIS WITHOUT INITIAL EOSINOPHILIA. (*Boston Medical and Surgical Journal*, December 23, 1909, p. 932.)

Gregg reports the case of a boy eleven years old with acute trichiniasis due to eating raw frankfurt sausages. The case is remarkable in that there was no eosinophilia for the first sixteen days under observation, after which it was present. The eosinophiles averaged 10 per cent. of the white corpuscles, and once were as high as 30 per cent. Trichinæ were demonstrated in the gastrocnemius muscle.

FRTZ B. TALBOT.

GROSSE, A.: MANAGEMENT OF PREMATURE INFANTS. (*Gaz. Méd. de Nantes*, August 14-21, 1909.)

In order to appreciate the vitality of a premature infant two things are to be considered, namely, its size and the duration of its intrauterine life. Exceptionally infants weighing only 800 to 900 grams and of six and a half months' life have survived, but these cases are rare. One of the most common drawbacks of premature birth is gradual hypothermia, which, unless promptly attended to, invariably becomes rapidly worse. If the body tem-

perature becomes lower than 35°C. an incubator is required, and this should be kept at 30° to 33° C. Once the infant has returned to normal heat the incubator is gradually cooled until the temperature of the room is reached. One thing may be said against incubating, and that is that ideal conditions are realized for bacterial development. Various authors for this reason favor a very warm room with an open fire. Warm baths at 38°C. are useful.

As to the feeding of premature infants, great care must be exercised.

The breast, of course, is by far preferable to anything else. If the baby is too feeble to nurse, a breast pump is advisable. The quantity of milk for each feeding varies greatly. In the twenty-four hours a child two days old should have on an average 128 grams of milk. By the tenth day this would reach 410 grams. After the tenth day the child should daily absorb one-fifth part of its weight of nourishment. Small and frequent feedings are advisable every hour or every hour and a half. Frequently premature infants survive following these rules carefully and keeping everything rigorously aseptic. C. D. MARTINETTI.

BUTLER, WILLIAM J., AND MEFFORD, W. T.: THE ANTIBODIES IN TUBERCULOSIS AND THEIR RELATION TO TUBERCULIN INOCULATION AND VACCINATION. (*Journal of the American Medical Association*, December 18, 1909, p. 2,092.)

The authors examined a number of cases of tuberculosis with a view to investigating the complement-binding antibody content of the blood of patients who had not and of those who had received tuberculin inoculations, and also to see if these antibodies bore any relation to the results of the tuberculin skin reaction, and came to the following conclusions:—

(1) No relation exists between the complement-binding antibody and tuberculin inoculations and vaccinations; (2) between the complement-binding antibody and the opsonic index, or (3) between the opsonic index and the tuberculin skin reaction.

Not only have our examinations failed to show any relation between tuberculin antibodies and tuberculin reactions and inoculations, but, on account of observing occasionally an inhibition of hemolysis with normal serums, we are strongly inclined to believe that the complement-binding reaction is not specific for tuberculosis.

G. R. PISEK.

LEVADITI AND LANDSTEINER: TRANSMISSION OF INFANTILE PARALYSIS TO THE CHIMPANZEE. (*Gaz. des Hopitaux*, November 30, 1909.)

At the meeting of the Société de Biologie of November 27, 1909, Levaditi and Landsteiner announced a successful inoculation of infantile paralysis into a chimpanzee by means of an emulsion of spinal cord. The patient, whose autopsy yielded the material employed, was thirteen months of age, and a typical case of the disease. Four days after death the inoculation took place in the peritoneum of the chimpanzee, who began to show characteristic symptoms seven days later. The autopsy revealed poliomyelitic lesions, inflammatory process in the gray matter and destruction of nervous cells. Two macaques inoculated from the chimpanzee became paralyzed after five days, consequently it would seem that the virus, like that of rabies, was very resistant and vigorous.

C. D. MARTINETTI.

SURGERY.

FAULDS, A. S.: THE SUBCUTANEOUS TREATMENT OF HERNIA IN CHILDREN. (*Glasgow Medical Journal*, December, 1909, p. 428.)

Many cases of hernia in children can be cured by the constant use of a truss, but it is often difficult for mothers of large families to devote the time and attention necessary for success in this mode of treatment.

For cases of simple inguinal hernia, which are readily reduced by the finger, and have no complications such as hydrocele, the author employs a very simple operation.

The hernia is first reduced, and the length of the canal and situation of the pillars of the ring determined by the forefinger. A strong curved needle is then armed with a stout silk thread and is introduced at the top of the opening into one pillar and brought out through the opposite pillar by passing in front of the sac and spermatic cord. The needle is again introduced at the point where it was brought out, passed along the axis of the canal in the subcutaneous fat. The two opposite pillars are pierced at the lower end and the needle again brought out at its

original point of entrance. By pulling the sutures together and tying with a tight reef knot, the opening of the canal is closed. The operator should take care that a sufficiently large bite of the pillars of the rings is taken, and that the ligature is firmly tied so that the pillars are brought in thorough apposition.

With proper technique this operation has given the author gratifying results. This operation possesses the advantage that there is practically no risk to the patient, who can be sent home for after-treatment without fear of the wound becoming infected.

SAMUEL FELDSTEIN.

MISEROCCHI, L.: TREATMENT OF ACUTE LOCAL SUPPURATIONS. (*La Pediatria*, November, 1909.)

With a view to avoiding disfigurement by incision and drainage in localized suppurations, Miserocchi has followed the plan advocated by Ritter. This consists in draining off pus as soon as formed by means of a hypodermic syringe until pus ceases to form and the cavity contracts. This treatment lasts on the average two weeks and leaves no trace. The author has had 24 cases all successfully treated, and does not hesitate to recommend the procedure.

C. D. MARTINETTI.

OECHSNER, JOHN F.: REMARKS ON PNEUMOCOCCUS EMPYEMA. (*New Orleans Medical and Surgical Journal*, October, 1909, p. 237.)

The progress of the pneumococcus empyema, says Oechsner, when early recognized and properly treated is almost invariably favorable. It is the early diagnosis and proper surgical treatment that establish this fact. The author believes that many infants supposedly dying of pneumonia probably die from the result of empyema, and cautions against trying to clear up an unusually prolonged pneumonia. Exploratory puncture, aside from direct surgical invasion, offers, he believes, the only positive means of determining the presence of pus.

He advocates rib resection as the method of choice, as it does not add materially to the shock, always affords good drainage, and can be done quite rapidly. He selects the post-axillary, or even the scapular line, and deprecates irrigation. G. R. PISEK.

MEDICINE.

HAMBURGER F., AND SCHEY, O.: SYSTEMIC LYMPHADENITIS IN GERMAN MEASLES. (*Münch. Med. Woch.*, November 9, 1909, p. 2,309.)

The occurrence of swelling of the lymph glands was studied in an epidemic of German measles in Vienna during the spring and summer of 1909. Though the occurrence of postcervical adenitis in this disease is fairly well known, it is not mentioned in many text books. The general glandular enlargement of the disease is practically undescribed. To learn at what time this occurred and also to eliminate previous glandular enlargements from other causes, not only the ill children were studied, but also all those who had been exposed to the contagion. From this it was found that the adenitis was general, though, of course, varying greatly in degree. A number of children were brought first for the adenitis, and even admitted to the surgical department on that account. The adenitis appeared several days previous to the outbreak of the rash and other prodromal symptoms. This fact, though described previously by Koplik, was entirely new to the writers.

T. WOOD CLARKE.

HOCHSINGER, KARL: REMARKS ON THE DIAGNOSTIC SIGNS OF A CASE OF CONGENITAL CHONDRODYSSTROPHY IN INFANCY. (*Centralb. für Kinderhk.*, February, 1909, p. 43.)

Fetal chondrodystrophy, achondroplasia (Parrot) or micromelia, and osteogenesis imperfecta (Vrolik) were formerly confounded with fetal rickets. Both of these conditions produce marked shortening of the limbs in the newly born. Both a decided unwieldiness of the extremities and usually macrocephalus. Chondrodystrophy depends on a diminution of chondral ossification at the cartilaginous junctions with normal periosteal bone formation. Osteogenesis imperfecta is a general disturbance of the latter process with a normal cartilaginous ossification. In the first the shortness of the limbs comes from the limitation of linear growth in the long bones; in the latter from multiple intra-uterine fractures and bending of the shafts on account of a faulty process of ossification. The diagnosis of osteogenesis imperfecta is not difficult, and is made on the presence of numerous fractures found at birth of the limbs and ribs, together with a thickening of the cranial bones. The diagnosis of chondrodystrophy is in the

first months of life not always easy, the most marked symptom being the shortness of the limbs compared with the trunk, whereby there results a proportionately very long body. There are no evidences of fracture or bending of the bone. The cases should not be confounded with rachitis, myxedema and syphilis.

M. NICOLL, JR.

LEREBoullet, P., AND MARGORELLES, A. P.: EDEMA AND ANASARCA IN THE NEWLY BORN. (*La Pathologie Infantile*, June 15, 1909, p. 121.)

Anasarca and edema of the newly born apart from those cases which follow septicemia or an hereditary syphilis, and those which are caused by evident organic lesions, such, for instance, as may affect the liver, may be the result of a gastroenteritis, however mild, which produces hepatic and renal lesions. On this account the prognosis in such cases is grave, even though treatment may ameliorate the symptoms. The organic lesions, which have been caused by the intestinal trouble, do not readily yield to therapeutic measures.

M. NICOLL, JR.

FOERSTER, O.: SYMPTOMATOLOGY OF ACUTE ANTERIOR POLIO-MYELITIS. (*Berlin. Klin. Woch.*, December 6, 1909, p. 2,180.)

In the author's cases the meningeal symptoms were well marked, not only at the onset of the disease, but also during the whole course, and in a few cases even after the symptoms of paralysis had disappeared. Among these symptoms were pain and rigidity of the neck, hyperextension of head, especially when the attempt was made to lift the upper part of the body by means of the arms. Pain in the back was likewise complained of, especially on passive motion. All the painful muscles were also tender. The Kernig sign was present in a few cases. The condition so closely simulated cerebrospinal meningitis that in some cases lumbar puncture was resorted to as a diagnostic aid. The cerebrospinal fluid was clear under considerable pressure and contained an increased number of lymphocytes. The knee-jerk was not always absent. Ankle clonus was often present at the beginning of the attack and sometimes after the paralysis had disappeared. The Babinski sign was observed at one time or another in all of the cases.

The author saw not a few cases with protracted evolution, *i.e.*,

where the height of paralysis was not reached before the tenth or twelfth day. Relapses with renewed fever and fresh paralysis were not rare.

The author calls attention to a few characteristics of the paralysis. The foot is often spared, when all other parts of the lower extremities are involved. Even when a part of the foot is involved, the toes always remain free from paralysis. The same conditions are seen in the upper extremity.

An interesting series of cases is that of paralysis of the muscles of the abdominal wall. The author saw 4 cases in which the paralysis began in this part of the body. The symptoms were dome-shaped abdomen, with bulging during crying or coughing. These patients could not get up from the reclining posture without aid. Marked constipation, not much influenced by laxatives, was usually associated with this condition.

SAMUEL FELDSTEIN.

SISTO, G.: L'HEMATOLOGIE ET LA SYPHILIS HÉRÉDITAIRE. (*Annales de Médecine et Chirurgie Infantiles*, January, 1910, No. 1, p. 24.)

In the majority of instances, the red blood corpuscles of infants with hereditary syphilis are diminished in number. There is an increase in the number of white corpuscles, which may be polynuclear, leukocytes and lymphocytes. There is only a slight increase in the percentage of eosinophiles. Antisyphilitic treatment quickly causes the blood picture to become normal. There is no easy method of demonstrating the existence of spirochetæ in the blood.

FRITZ B. TALBOT.

HEUBNER, O.: SEVERE DIGESTIVE INSUFFICIENCY IN CHILDREN. (*Jahrb. für Kinderhk.*, December 2, 1909, p. 667.)

This disease is one rarely seen in hospital or dispensary practice. Most of the cases come from the upper classes, where the patients have had the best obtainable care and nursing during the nursing period. This exhaustive paper is based on 10 carefully studied cases, although the author has seen many more cases in his consultation practice.

The manifestations of this affection usually appear in the second or third year of life, and last about one or one and a half years. All but 1 of the 10 cases had had breast milk at some time

during the first year, 4 during the whole of this period. Most of the patients enjoyed normal growth and development before the onset of the disease.

The mode of onset varied: in 6 it was sudden with fever and diarrhea, in 4 it was chronic in nature.

There are two chief types or stages of this affection. In the first, the milder type, the chief symptoms are at first insufficient gain in weight, meteorism and abnormal character of the stools. The unsatisfactory gain in weight leads to frequent change in the milk diet, which results in but slight temporary improvement. In the later stages of this period not only is there no gain, but considerable loss of weight, terminating in atrophy. The stools are tough or friable, light gray or grayish-yellow, alkaline, mixed with mucus, and foul. The fat is increased to over 30 per cent. The difficulty at this stage is not alone with the fat of the milk, but probably with some of the other constituents of the milk, such as the inorganic salts. Indeed, milk as a whole is not well borne, and even some of its modifications, such as malt soup or butter-milk, which are so often useful in similar disturbances during the nursing periods, is not well borne by these patients.

Milk must, therefore, be entirely eliminated from the diet for a considerable length of time. The diet should consist of gruel, potato, zwieback, butter, meat, acorn-cocoa, apple sauce and hygiama. At best the progress is slow, and treatment tedious.

The second type of the disease is of much graver significance. The defect in the digestive and assimilative functions has reached the stage where even carbohydrates are no longer assimilable. The first indication of the existence of this condition is a change in the character of the stools. They are tough, light or grayish-white in color, no longer foul, but acid in odor and reaction. If milk is now withdrawn from the diet, as in the first type of this disease, temporary improvement results. There may be some gain in weight with improvement in the general condition and the stools may assume a normal appearance.

Suddenly, however, without any change in the diet, the "catatrophe" appears. The abdomen becomes markedly distended, peristalsis is increased and is accompanied by eructation and passing of foul flatus. This is soon followed by abundant watery evacuations of brown or grayish-brown color, neutral or acid, in reaction and mixed with gas bubbles. Sometimes the stools contain much mucus, and yellow or red flakes resembling raw meat.

The microscope in these cases reveals the presence of blood and pus, but no specific bacteria. High fever may be present, but is usually of but short duration. The general condition becomes very poor, and there is rapid loss of weight. The extremities are cold, the temperature may be subnormal, the pulse is weak and slow, and sleep is disturbed by the abdominal distention, colic and tenesmus.

In the gravest of these cases our only refuge is the use of breast milk, even for older children. Next to human milk, ass's milk is likely to be useful. All other carbohydrates and fats must be excluded from the diet and only proteids allowed, such as egg albumen, casein, lean meat and beef juice.

With improvement we may gradually allow the use of zwieback, cakes, wheat rolls, and later still, and very carefully, fat in the form of butter. Little reliance can be placed on pharmaceutic preparations, but lactopeptin, acidol pepsin and pancreatin may be tried.

These cases the author considers to be identical with those described by Herter under "Intestinal Infantilism." The author's views, however, in regard to the nature of the disease, differ radically from those of Herter. He attributes no importance to the rôle of bacterial infection, which he considers secondary and not primary.

The essential nature of this disease, as the author conceives it, is that of a congenital and primary defect or weakness of the digestive and assimilative functions of the gastrointestinal tract. While no great demands are made on this tract, as when the infant receives breast milk, the condition remains latent. With beginning of artificial feeding and its greater demands on the digestive functions, the symptoms of this affection become manifest.

Although congenital in origin, the defect is not permanent in nature, and partial or complete recovery usually takes place.

SAMUEL FELDSTEIN.

WOODBURY, W. R.: INFECTIOUS DISEASES AND THE MOUTH. (*Boston Medical and Surgical Journal*, January 27, 1910, p. 112.)

The most common physical defect in school children is decayed teeth; of 600,000 in New York City, nearly 65 per cent. of those examined were found to be dental cripples. Only 8 per cent. of the community take care of their teeth, and neglect, asso-

ciated with unhygienic habits of eating, and obstruction in the air passages (tonsils and adenoid hypertrophy), causes round shoulders, narrow chests and repeated attacks of nose, throat and bronchial affections. Furthermore, dental caries afford nidus for diphtheria, scarlet fever, etc. People who are well may thus be carriers and potential spreaders of epidemics.

FRITZ B. TALBOT.

THERAPEUTICS.

STEINHARDT: THE PATHOLOGY AND THERAPY OF STUTTERING. (*Deutsche Aerzte Zeitung*, January, 1910, p. 1.)

Stuttering is purely a nervous disturbance; it may be accentuated by the efforts of the patient to overcome the trouble.

In one instance, after a tremendous adenoid growth was removed, the stuttering was so much improved that a short course of treatment cured it entirely. The principal treatment is directed against the general nervous condition, and toward strengthening the will power, always remembering that one is dealing with a disease and not a bad habit. A brief description of methods for curing stuttering is given.

FRITZ B. TALBOT.

INFANT FEEDING.

KOLFF, W., AND NOEGGERATH, C. F.: COMPLEMENTS OF HUMAN MILK. (*Jahrb. für Kinderhk.*, December 2, 1909, p. 701.)

Thirty specimens of milk from women at various periods of nursing were treated with the red blood cells of the guinea pig, rabbit, sheep, horse and dog. Although human serum contains a hemolysin for these cells, in the majority of cases no hemolysis resulted when human milk was used. When hemolysis did take place, it was but slight in degree. The milk of three wet-nurses did not possess any bactericidal properties, nor did they show the presence of a bactericidal complement when inactivated human immune sera were employed. The results being negative, it follows that no important theories as to the immunizing properties of human milk, such as has been drawn by Pfaundler, can be deduced.

SAMUEL FELDSTEIN.

BOOK REVIEWS.

COLLECTANEA JACOBI. Collected Essays, Addresses, Scientific Papers and Miscellaneous Writings of A. Jacobi, M.D., LL.D., in Eight Volumes. Edited by WILLIAM J. ROBINSON, M.D. New York: The Critic and Guide Company, 1909.

That a man who has always been so actively and unremittingly engaged in the practice of medicine as has Dr. Jacobi should have been able to write enough to fill nearly four thousand pages would be in itself noteworthy, but that from among the multitude of his written and spoken efforts so much could be selected of such excellence compels respectful admiration. It would be entirely unnecessary to call the attention of the readers of the ARCHIVES OF PEDIATRICS to Dr. Jacobi's well-recognized position as the dean of the pediatricists of America, or to remind them of his career of almost sixty years as practitioner, teacher and publicist, did not these well-made, well-edited volumes from the very extent of their scope, and the perennial interest of their contents recall to mind the lasting debt of pediatric medicine and medicine in general to his great intelligence and unsurpassed energy.

Of the eight volumes, the first three are devoted to "Pediatrics"; but in the two volumes labelled "Pathology" and "Therapeutics" there are many articles bearing upon the disorders of children, so that five volumes may be said to be devoted to the work with which his name is so closely attached. Among these the papers dealing with diphtheria, some written before the days of intubation and antitoxin, some afterward, are especially interesting because they give a picture of the progress of medical science in a conspicuous field. But this is only one of many subjects. Perhaps as instructive as any are those articles on pediatrics in its relation to general medicine, and the history of pediatric medicine in America, in which we see through the eyes of one who watched the beginnings and now views the present stature of this branch of our profession. And as the name of Abraham Jacobi correlates with the progress of pediatrics in America, so these five volumes of his medical writings indicate in considerable detail the advancement of the past fifty years.

In the volumes entitled "Addresses" and "Miscellany" are collected articles on general subjects, public addresses, occasional and after-dinner speeches, etc., all revealing anew the philosopher and public-spirited citizen.

These are eight remarkable volumes, even for Dr. Jacobi.

DISEASES OF CHILDREN. Edited by ABRAHAM JACOBI, M.D., LL.D. An authorized translation from "Die Deutsche Klinik," under the general editorial supervision of Julius L. Salinger, M.D. With thirty-four illustrations in the text. Pp. 828. New York and London: D. Appleton & Co., 1910.

This book is composed of translations of twenty-three monographs by leading pediatricists in Germany and Austria. It is not cyclopedic in nature, but one is surprised how widely the field of children's diseases is covered by the various articles. The high character of the work needs no further indication than the announcement that the papers therein have been written by men of the standing of Monti, Baginsky, Escherich, Heubner, Finkelstein, Henoeh, Czerny, Keller, Hochsinger, Neumann and Bendix. The translation is in most instances excellent; in some articles, however, fidelity to the original form seems to have resulted in a somewhat involved style which is rather difficult reading. It is impossible to comment on the better articles without considering practically the whole book. Suffice it to say that as a presentation in English of the latest German pediatric thought, the book fulfils its function most admirably.

BOOKS RECEIVED.

FUNCTIONAL DIAGNOSIS. THE APPLICATION OF PHYSIOLOGY TO DIAGNOSIS. By THOMAS G. ATKINSON, M.D., Associate Professor of Neurology and Physiology, Chicago College of Medicine and Surgery. Pp. 213. Chicago: Chicago Medical Book Company, 1909.

PRACTICAL HANDBOOK OF MEDICAL ELECTRICITY FOR STUDENTS AND PRACTITIONERS. By HERBERT MCINTOSH, A.M., M.D. Containing over two hundred illustrations. Pp. 510. Boston: Therapeutic Publishing Company, Inc., 1909.

ARCHIVES OF PEDIATRICS

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ORIGINAL COMMUNICATIONS.

THE CUTANEOUS TUBERCULIN TEST.*

BY CLEMENS F. VON PIRQUET,
Baltimore.

The fact that the injection of tubercle bacilli and derivations of the same into a tuberculous organism is followed by general symptoms, has been known for the past twenty years. It was first noted by Arloing and Courmont that tuberculous animals injected with tuberculous substances died after a short time. These authors thought that the effect was due to the secretions of the tubercle bacillus. They imagined that these bacilli secrete a substance which deprives the body of its natural protective elements. The injection in an already tuberculous animal acts so violently for the reason that at that time the organism has no power of resistance.

* Paper read before the Philadelphia Pediatric Society on February 8, 1910.

When Koch had discovered the tuberculin, he first applied the injection of this extract with the intention of making the human organism immune to tubercle bacilli. Many of you will remember the time of Koch's discovery, with the general hope that this substance would prove a unique curative means against tuberculosis, and you remember that after a short period of enthusiasm a great disappointment set in. Only many years afterward, tuberculin used in far smaller doses became again more generally applied in therapeutics. But one valuable thing has been derived from that first period of tuberculinization, that is, the diagnostic use: after an injection of tuberculin, the tuberculous organs show an inflammatory reaction, and at the same time general symptoms, especially fever, follow. Koch made the explanation that the body already contained a great amount of tuberculous substances, and that any addition to these substances caused a toxic action. This theory, which is called the "additional theory," has been generally believed up until later years, when in 1903 I formed, in collaboration with B. Schick, a new theory of the action of tuberculin, that is, the "antibody theory." We had seen that a human body which has previously been injected with horse serum reacts on a second injection of the same after a certain interval of time with an immediate outbreak of fever or exanthema. By comparing the interval of time of the first serum sickness with the facts given in the science of antibodies, we came to the conclusion that it is an antibody which arises in the organism ten to fourteen days after the first injection, and which makes the organism react on a second injection. I could prove the value of this theory in extensive studies of cowpox vaccination, and from the results of these studies I also came to a practical conclusion for a new method of tuberculinization which I called the cutaneous method. We believe that these antibodies have some kind of a digestive action on the microorganism. The cowpox microorganism, for instance, a short time after the first infection would not act on the tissue, but would develop after its own laws of parturition and evolution; but the existence of that colony of vaccinia arouses in the organism the formation of a substance which attacks the foreign body in digesting it. By this digestion, the microorganism is killed, but a toxic substance is produced and makes symptoms of general disease. In a second vaccination the few vaccinia bodies which come into the skin are immediately digested; the amount of toxin which is formed is a minimal one and we see only a very

small reaction, which appears soon after the inoculation of vaccinia into the skin. The immunity against cowpox and smallpox consists in this early reaction. In tuberculosis, the antibodies seem not to have a digestive power against those tubercle bacilli which form a large mass, but only against those bacilli which are on the outside of these masses, or which are isolated, therefore the microorganism remains alive in the same organism which contains antibodies. This antibody is not limited to one of the body substances, like the blood, but is contained in the fluids and tissues of probably the entire body.

I proved, contrary to Koch's opinion, that not only the tuberculous focus gives the characteristic reaction to tuberculin, but that every spot of the skin or the subcutaneous tissue is ready to give a characteristic reaction. To the history of this point I must add that Epstein and Escherich in the years 1901 and 1902, and also many others, had noticed the subcutaneous reaction, which Escherich called "stichreaction," but they had not marked the theoretical and practical value of it. Schick in 1904 studied the subcutaneous reaction in accordance with our previously stated theory, and proved its specific character. In 1907 I made public my studies about the cutaneous test. In that year I had made experiments on the basis of 988 cases and 100 postmortems. The number of postmortems of individuals who had undergone the cutaneous test has now reached 328, and has confirmed my first opinions.

328 POSTMORTEM FINDINGS OF CHILDREN WHO HAD UNDERGONE
THE CUTANEOUS TEST AT THE CLINIC OF PROFESSOR
ESCHERICH, IN VIENNA, AND THE DEPART-
MENT OF DR. MOSER, IN VIENNA.

CUTANEOUS TEST.	Tuberculosis present at the postmortem.			No. Tbl. found at Pm.	Total.
	Deadly.	Accessory.	Total.		
Negative	23	6	29	161	190
First negative,					
Later positive ..	6	6	12	2	14
Positive	102	21	123	1	124
	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
Total	131	33	164	164	328

The principle of the localized tuberculin reaction consists in that the tuberculin is digested on the point where we inject it into

the body. This system of localized reaction, since my publication, has given rise to very many other tests by varying the point of application. Wolff-Eisner and Calmette used the local method, applying the tuberculin on the mucous membrane of the eye. This method by its extreme simplicity caused great excitement in France and in other countries, but came to a standstill when it was shown that in several cases the conjunctiva was harmed by the procedure. I declined that method from the beginning, because I thought that a reaction which can be produced on every part of the skin ought not to be performed on a point of the body which is of the most delicate character, and I waited quietly until the first storm of enthusiasm was over, for I was sure that my method would prove more satisfactory in the end, and am glad to see that this stand has come. Others applied the tuberculin to the nose, to the ear, to the mucous membrane of the vagina, they applied it in the form of rubbing tuberculin into the skin, of injecting tuberculin in the derma, etc. Hardly any organ remains to-day in which tuberculin has not been tried. After the stream of literature has somewhat passed, we can now collect what valuable things have come out of it. The subcutaneous injection in the way Koch used it since 1891 is still the best method in case one wishes to know whether a certain focus is of a tuberculous nature or not. If, for instance, we have a lupus of the face or a tubercle in the eye, or a renal affection, we will inject tuberculin, and see whether there is an inflammatory reaction in the respective tissue. For the application in animals a subcutaneous test is also of great value, because here we can inject a very large amount of tuberculin, which gives very marked fever reaction. We have learned furthermore that the conjunctival reaction is valuable in cattle, because a conjunctivitis in a cow does not disturb her comfort. We have seen that in pigs and sheep and small laboratory animals the intracutaneous injection is preferable, but I think it has been proven at the same time that for human beings, and especially in children and in those cases in which we cannot control the tuberculous focus itself, the best method is the cutaneous one.

Now what is the meaning of a positive reaction? The inflammation which we see around the spot of tuberculization means in every case that the tuberculin is digested locally, and that means that the organism contains specific antibodies against tuberculosis. These specific antibodies are formed only when the or-

ganism has been infected previously with tubercle bacilli. In that way a positive reaction means a previous infection with tuberculosis. We do not know by the reaction alone how far this infection has gone; it may be that the infection is limited to one single gland, or it may be that one-half of the lungs has already been destroyed by the tuberculous process. For this secondary question we have to apply all the other methods of physical and microscopic examination. In general the reaction is very intense if the infection has just started or if there has lately been a progress. The negative reaction is not as conclusive as a positive one, because it does not mean in all cases that the organism is not infected. It is the same in this antibody test as in other antibody tests; for instance, in the agglutination in typhoid fever or in the Wassermann test, that antibodies are not always present in a large enough quantity to give the reaction; so we see especially that the cutaneous test fails often in chronic or emaciated cases of tuberculosis; it is lacking very often in the later stages of miliary tuberculosis and tuberculous meningitis. There is furthermore the very interesting phenomenon that during the first week of measles the reactivity against tuberculin is lacking. So true is it that in an individual who by a previous examination we know is tuberculous, we can make the diagnosis of measles or of a miliary tuberculosis by the negative reaction. The practical value of a test is not a very great one in adults, for the reason that so many of us are infected with tuberculosis, and that the positive reaction, therefore, is very common. It should be applied only then if we have a doubtful physical symptom, and we wish to know whether this organic lesion is of a tuberculous nature or not. An intense positive reaction speaks in favor of the tuberculous nature, but does not entirely decide the question. On the other hand, a negative reaction in two or three subsequent trials proves that the individual is not tuberculous at all, so it proves that the lesion in question is not tuberculous. In children, especially infants, the positive reaction alone without definite physical symptoms is already a serious warning, because we know that the infection of tuberculosis in the first years of life is in most cases of a widespreading nature. The main questions which are to be decided with the cutaneous test in children are the following: chronic intestinal marasmus, bone lesions, emaciation, anemia, subacute bronchitis, glandular swelling, cases of furunculosis and a great many other skin lesions, and finally doubtful symptoms

of a beginning meningitis. In these cases we apply the reaction as a means of individual diagnosis, but it can also be used as a means of prophylaxis. You will know that Koch's tuberculin reaction has had an enormous influence on the tuberculosis of cattle, not at all as a therapeutic agent, but only as a diagnostic means, by a separation of the infected cattle from the healthy ones. Koch's injection could not be applied to mankind in a general way, but the cutaneous reaction can be. But here we have another impediment, that in families we cannot make an entire separation of tuberculous and non-tuberculous cases. There is only one kind of institution in which the separation is possible and profitable, and that is in an orphan asylum, in which children of the first years of age are kept separate from the outer world. I take pleasure in telling you that I had the opportunity of making such a separation in Baltimore in an orphan asylum. All 227 children were tested with the cutaneous test. Not a single one of the children below one year reacted, but 6 of the children between one and three years, and 19 of those between four and six years. The latter will be sent to the farm of the institution, and the 6 smaller children will be kept separate in a room of their own. In this way the other children during their stay at the asylum up to the sixth year will have no possibility of getting a tuberculous infection from their playmates, the only possibility being an infection from the side of the staff, which of course has to be carefully controlled. Such a separation, as I mentioned above, is worth while only in the first years of life.

The cutaneous tuberculin reaction is only one instance of the diagnosis of infectious diseases, which is possible on the basis of the antibody theory. In a similar way the cutaneous diagnosis has been applied to glanders of horses, and lately to the group of diseases which are caused by *trichophytia* microorganism. It is almost certain that a similar cutaneous diagnosis of syphilis will be possible as soon as we are able to make cultures of *spirocheta*, and to make an extract of it, with the same concentration as tuberculin. This part of the antibody science is in a rapid course of development. It is no longer limited to laboratory work, but as you see it has reached practical clinical conclusions, and I hope that the interest which has already been shown in America for the theoretical point of it will also extend to the clinical side, and that American investigators will take an active part in a further extension and perfection of this knowledge.

THE STOOLS OF THE NEWBORN AND THEIR SIGNIFICANCE.*

BY THOMAS S. SOUTHWORTH, M.D.,
New York City.

The description of the stools of the newborn infant, as it appears in the text books of obstetrics and pediatrics, consists of slight variations from a stereotyped conception which has apparently been handed down without any recent painstaking investigation. The following paragraph from a recently revised edition of an important British text book on pediatrics† may be quoted as giving the usual conception of such stools:

"The meconium which the infant passes during the first three or four days is of a dark greenish-brown color, of a viscid semi-solid consistence, slightly acid in reaction, and without odor. At birth it is sterile; but within a few hours microorganisms find their way into it through the anus. It contains epithelial cells and mucus from the intestine, and its color is due to bile, but the bulk of it is believed to be mainly composed of matter derived from the vernix caseosa which the infant has swallowed during intra-uterine life along with liquor amnii. (Zweifel.) After four, or, at most, five days the motions cease to contain meconium and assume the character of normal infantile feces. In a healthy breast-fed infant the motions are from two to four in number daily during the first month or two, and usually two or sometimes only one daily after that. They are of an orange-yellow color, and of a uniform semi-solid consistence."

From one of our most popular text-books on obstetrics‡ I take the following extract: "After the third or fourth day with the establishment of the mammary secretion, the meconium disappears, and its place is taken by feces which are light yellow in color, homogeneous in consistence, and possess a characteristic odor. For the first few days the stools are not formed, but after a short time they take on the characteristic cylindrical shape. The physician should make it a rule to inspect the stools at each visit, as in this way important information may be gained concerning the digestion of the child."

* Read before the Twenty-first Annual Meeting of the American Pediatric Society, May 28, 1909.

† "Guide to the Clinical Examination and Treatment of Sick Children." Second Edition, 1908. By John Thompson, M.D., Edinburgh.

‡ "Obstetrics." J. Whitridge Williams, M.D., 1908.

These two quotations, which are fairly representative, place before us the usual present-day teaching on this subject. Summed up in a few words this is that, after a period varying from three to at most five days, the meconium gives way to yellow or orange-yellow stools, and that these are of a uniform homogeneous, semi-solid consistency, that this is the normal stool and that any material departure from this classical type indicates a disturbance of digestion on the part of the infant or a deficient or unsuitable secretion of breast milk on the part of the mother.

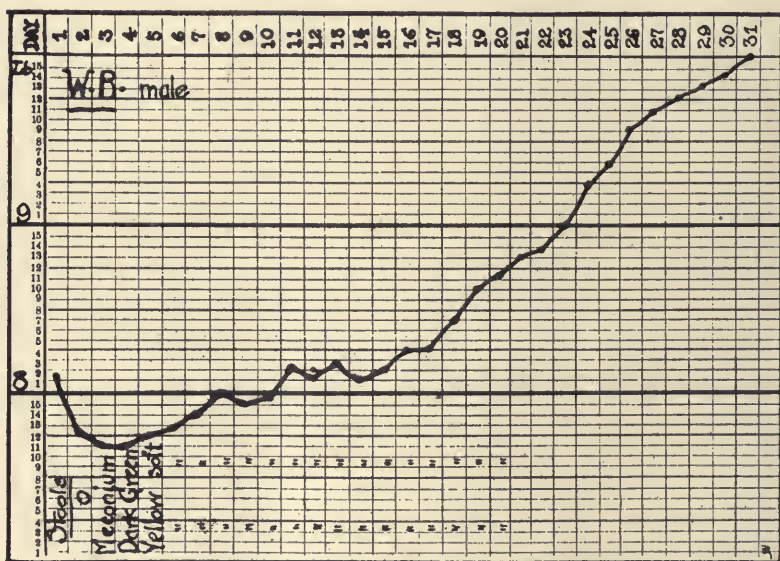


CHART No. 1—Classic stools, but slow gain. Mother had localized phlebitis.
Rapid rise began on 15th day.

My observations of the stools of newborn infants in the maternity wards of the Nursery and Child's Hospital, which have extended over a number of years, are not in accordance with this accepted view, and I am inclined to believe that the reason for its persistence in the text books is due to the fact that matters pertaining to the newly-born infant lie in that debatable territory which is not occupied exclusively by either the obstetrician or the pediatrician.

In pursuit of this question, I have personally tabulated the data offered by the maternity ward charts of 50 infants born in our institution, choosing only those whose subsequent gains in weight

upon the breast alone showed that their mothers were capable of furnishing an adequate amount of breast milk. This choice was important because it eliminated the question of the color and character of the infants' stools being due to a seriously defective or insufficient secretion.

STATISTICS OF 50 INFANTS SUCCESSFULLY BREAST-FED.

Birth weight	from 4 lbs. 2 oz. to 9 lbs. 10 oz.	Average.
Initial loss	3½ " " 17 "	7 lbs. 8 oz.
Lowest weight	on 2d to 7th day.	8½ "
Birth weight regained	" 5th " 22d "	3 3-5 days.
		9 3-5 "
Regained by	7th day,	14 cases.
" " 8th to 10th "	15 "	
" " 11th " 15th "	16 "	
" " over 15 days,	5 "	
Rapid gain established on	4th to 18th day.	Average.
Established by	7th "	On 8½ day.
" on 8th " 10th "	18 cases.	
" " 11th " 14th "	17 "	
" " 15th " 18th "	8 "	
	7 "	

COLOR AND NATURE OF STOOLS OF SAME INFANTS.

Meconium	lasting 2-5 days in 50 cases.	Average 3½ days.
	Appearing	Average cessation on
Brown	3d to 5th days " 14 "	4½ days.
Dark-green	4th " 7th " " 31 "	4th day.
Yellowish-green	5th " 11th " " 7 "	8th "
Greenish-yellow	5th " 12th " " 20 "	7th "
Greenish-yellow soft residue	5th " 18th " " 28 "	8¾ days.
Yellow soft residue	5th " 20th " " 46 "	Av. estab'd on 9½ day.
Established by	7th day,	18 cases
" on 8th " 10th days,	15 "	
" " 11th " 14th "	5 "	
" " 11th " 14th "	9 "	
" over 14 "	4 "	

Yellow loose in 3 cases continuing until 12th, 19th, and 34th days, respectively.

NOTE.—Averages of birth weights, initial loss and day of lowest weight show the cases to be normal ones. Day birth weight is regained shows that this may be late without prejudice to successful nursing. Average day upon which a definite sustained rise in weight is begun shows that this is possible after a considerable period of adjustment has elapsed. The color and nature of the stools show the common intermediate stages between the meconium and the classic soft yellow stool, and the late appearance of the latter as opposed to the usual teaching.

The earliest stools of the infant consist of meconium and are of a brownish color. These persist for three or four days, and are followed by bile-tinged mucoid intestinal secretion, which may be dark-brown or brown-yellow, but much more commonly dark-green, depending upon whether the bile-pigment is in the form of bilirubin or biliverdin. About the sixth day a certain proportion may assume the classic yellow or orange-yellow color as the exception rather than the rule, but the majority are greenish-yellow, still more or less fluid, gaining gradually in consistency, and only at a later period—which varies considerably—becoming yellow.

The change therefore from meconium to the classic yellow, semi-solid stool is not, as the student might suppose, an abrupt one, but, as it physiologically should be, a gradual one, and the color, fluidity, and consistency, follow no fixed rule. The early scanty milk residue appears in the stools in small flakes, for which the term "curd" is misleading, because this carries with it the suggestion of imperfect digestion. In the fluid or semi-fluid stools, which are not uncommon and scarcely abnormal at this period,

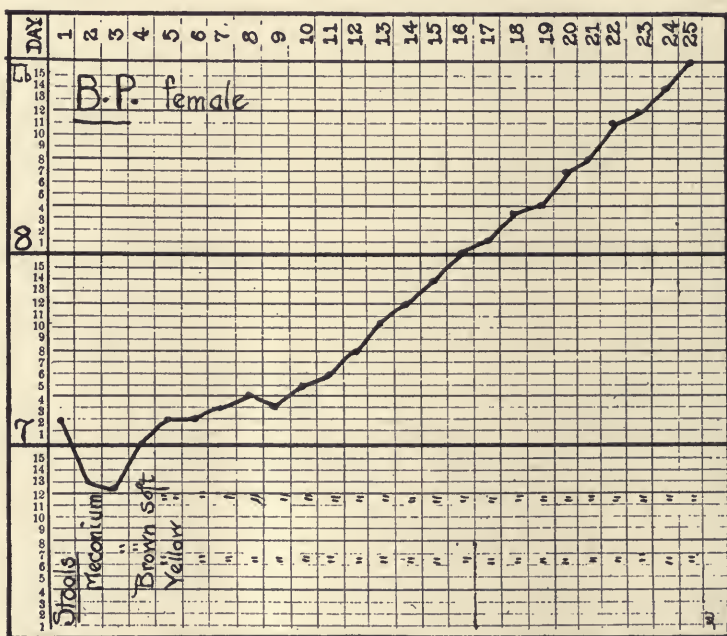


CHART No. 2—Classic stools. Infant a poor nurser. Delay in establishing physiological accord. Rapid rise began 10th day.

these flakes may hardly be recognizable, but in the semi-solid stools they are at first more or less separated by the viscid, mucoid secretion of the intestine. As the milk residue increases, the intestinal secretion, as a rule, decreases, allowing aggregation of the flakes into fairly homogeneous masses.

The importance of this variability of the stools in the newly-born lies in the prognostic and diagnostic significance which may be attached to them. Suffice it to say that under the present teaching the conclusions drawn are often most erroneous, and that in consequence steps are often taken which have a serious bearing

upon the welfare of the infant. I am personally convinced that the larger part of these variations are physiological, pending the establishment of complete harmony between mother and child in the extra-uterine phase of nutrition, and that they are by no means pathological. While they should be carefully noted and may suggest indications for minor changes in the management of mother and child, they should not be taken too seriously unless there is overwhelming confirmation in other directions.

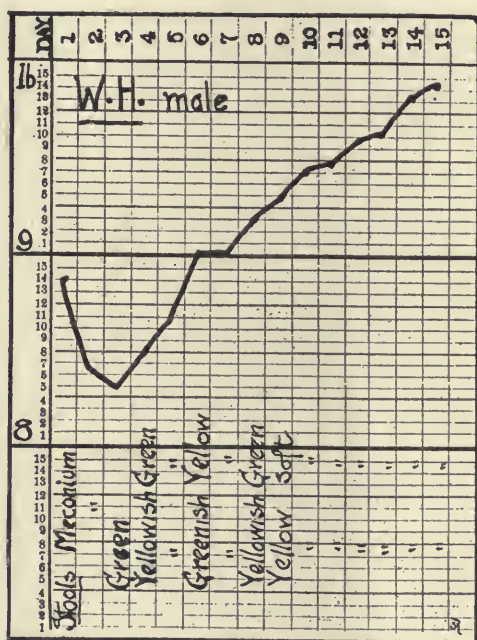


CHART No. 3—A common type of stools. Yellow soft stools appearing on 9th day. Gain in weight prompt.

It would perhaps be natural to expect that the weight curve would furnish the most important guide at this juncture, but this also is often non-committal. Excepting in those extremely rare cases where there is no secretion from the breasts, or where sufficient nutriment cannot be obtained by the infant to maintain the body weight after the fourth or fifth day, it is only occasionally possible to make a reliable prognosis.

In vigorous infants who are able to secure promptly from the maternal breast suitable quantities of milk, and in whom after the initial drop the weight curve turns sharply upward and the birth

feedings to start it upward. Or the stools may be of atypical color and consistency, but an improvement in all directions takes place when the mother begins to sit up and has regained some strength. With a rapidly rising weight curve the character of the stools may be practically disregarded.

We are still influenced by another former fallacy, which is, that the birth weight should be regained at the end of a week. This occasionally happens, and involves rapid and immediate gains

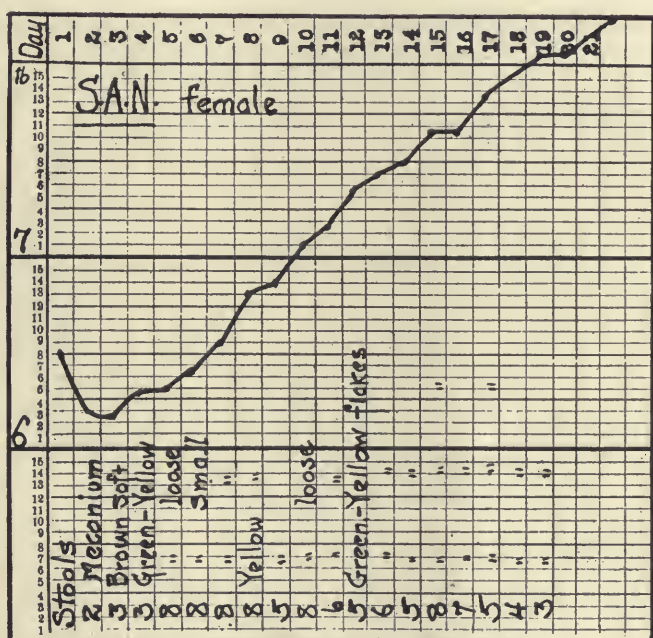


CHART No. 5—Atypical stools. Frequent stools. Rapid gains.

succeeding the initial drop, but numerous observers have proven that this is not the rule, and that the time for regaining the birth weight is later in the majority of infants. I would particularly emphasize the fact that it may be considerably postponed without necessarily prejudicing the successful establishment of breast feeding.

The teaching—which to the best of my knowledge we owe to Dr. Holt—to wit, that frequent dark-green stools are an evidence of insufficient nourishment, has been a valuable one, but it is frequently misunderstood and misapplied. The stools thus described are a reversion to the fetal or meconium stage, and this reversion

occurs when the intake of milk is so scanty that practically no milk residue reaches the rectum and is expelled from the bowel. Such stools consist almost exclusively of the mucoid secretion from the intestine. When they continue too long after birth, or, equally important and still more striking, when at any period of lactation they follow upon stools which have previously contained milk residue, they are a valuable indication that the infant is receiving or securing a very limited or insufficient amount of food.

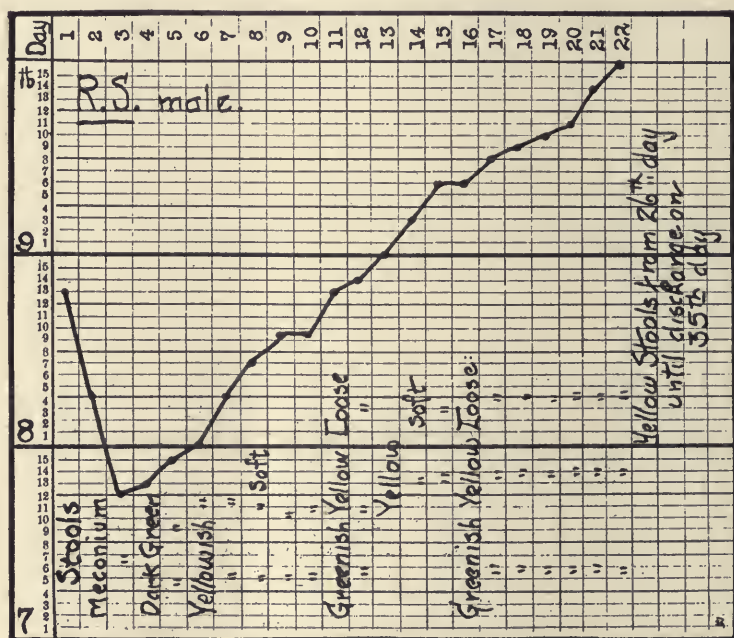


CHART No. 6—Atypical stools. Rapid gain in weight despite loose stools.

The error which has attached itself to their interpretation is the old one of assuming that any green color of the stools necessarily indicates some disturbance of the infant's digestion. Such dark green mucoid stools lose their characteristics and cease when a sufficient food residue passes through the intestinal tract. They disappear with a larger ingestion of breast milk, or, where necessary, with the addition of supplementary feedings.

These dark green mucoid stools should not be confused with lighter green stools in which the food residue, rather than the mucoid intestinal secretion, bears the green color. These may or

may not be of significance. A light greenish-yellow tinge, as I have shown above, is a very common transition stage, of longer or shorter duration, in the stools of the newly-born before they finally take on the classic yellow color. They have no relation to the green stools of summer diarrhea with which they are frequently confounded and the infant consequently subjected to utterly unnecessary and disturbing medication. Such a color is by no means inconsistent with a steady increase in the infant's weight.

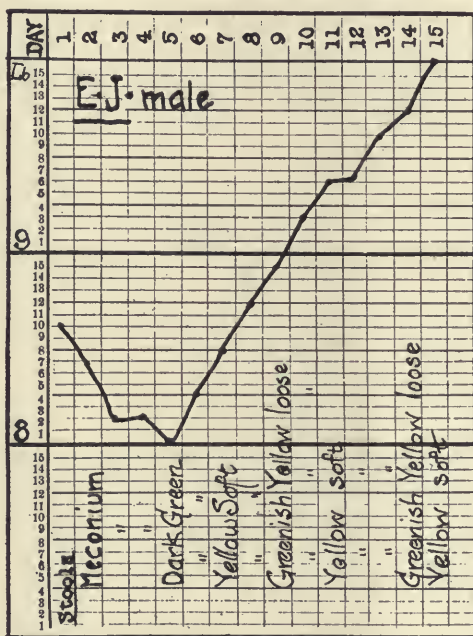


CHART No. 7—Atypical stools with phenomenal gains.

An estimate of the diagnostic value of the newly-born infant's stool, from the standpoint of its digestion, should be based upon the color in the interior of the large or small masses of food residue. This is readily ascertained by smoothing them out upon the napkin. When this color is yellow the superficial color, or the color of the material by which they are surrounded, is of little importance, for it is certain that there is no serious disturbance of digestion.

One of the chief interests, however, of this investigation has lain in the discovery that so many infants continue to make satisfactory progress in weight with atypical stools. This is particu-

larly true of those infants who have loose stools which soak into the napkin, leaving little definite residue upon its surface; such remains of flaky residue as do appear in indistinct form more often having a yellow color, but not infrequently in places a greenish-yellow, light-green, or even white color, without seeming influence upon the progress in weight. A certain number of these infants I have found to be receiving a breast milk containing a high percentage of fat, but I am not yet fully prepared to say that that is

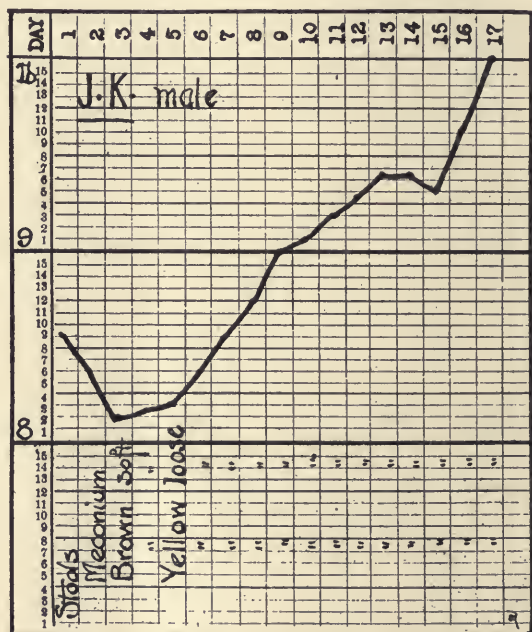


CHART No. 8—Loose yellow stools. Excellent gains.

always the case. Common sense measures, which are too often ignored or neglected, will often serve to bring about the physiological adjustment between mother and infant, where at first this may seem unpromising.

CONCLUSIONS.

The classical orange-yellow, semi-solid stools appear in the majority of newly born infants later than is usually stated.

Considerable variations in the color and consistency of the stools of newly born infants are entirely compatible with regular gains in weight.

Such variations in the stools for ten days or more, even with slow, halting, or irregular gains in weight, give no certain indication that successful breast feeding cannot be carried on.

Whatever the character of the stools, weaning is never indicated if the infant is gaining steadily in weight; nor with delayed gains until intelligent efforts have been made to bring mother and infant into physiologic accord.

In the dark-green mucoid stools of insufficient nutrition, which are starvation stools, and not limited in their occurrence to the first few days of life, there is a practical absence of milk residue.

A good yellow color of the masses of milk residue, or a yellow color when they are smoothed out, precludes the assumption of indigestion, whatever the color of the exterior or of the surrounding medium.

Delayed gains in weight are very often the result of factors which prevent the infant from securing a sufficient quantity of milk from perfectly competent breasts, and with patience and ingenuity these difficulties may be overcome.

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DISCUSSION.

DR. MORSE.—I am inclined to think that we shall not fully understand these apparent abnormalities in the stools in the first few weeks of life until we combine our observations of the stools with simultaneous chemical examinations of the breast milk. I think that we shall find that the variations in the stools depend upon the composition of the breast milk. The early brown color corresponds to the colostrum stage. Later the color depends on whether bilirubin or hydrobilirubin is present. The color also depends upon the relation between the amount of fat and proteids in the milk.

DR. GRIFFITH.—The first chart interested me because it bears out the conclusion that Dr. Gittings and I communicated to the Society a couple of years ago, that there was nothing to be gained by early forcing of the infant's feeding; for instance, by the breast of another woman. It looks as though the child required a little time to adapt itself. At the end of two weeks the gain is no greater in those fed from the day of birth and those who went hungry until the mother's secretion was established.

I thoroughly agree that the child's general condition of health and gain is of more importance than the character of the stools. Change in the stools may give a warning, but it is not a positive indication to stop the feeding.

DR. WINTERS.—This paper of Dr. Southworth's should be placed in the hands of every obstetrical nurse in America. They are totally ignorant of these indications, and because the stools are a little green they think something is very wrong, and, of course, they have great influence with the mother.

DR. SHAW.—Twelve years ago Epstein told his clinic that it was almost impossible to show the so-called classical normal stool. We see many babies that are doing perfectly well with apparently slightly abnormal stools.

DR. FREEMAN.—I am in accord with what Dr. Southworth has said about these cases. The results, however, in private practice, are much better than his showing with the hospital infants. A great proportion regain their weight at the end of a week. If the baby is gaining in weight you can ignore some irregularities in the character of the stools.

DR. SOUTHWORTH (closing remarks).—I think we all recognize these conditions, but I have not been able to find that the subject has been crystallized in this form. I tried to pick out a chart in which the gain was immediate and sharp after the initial drop and accompanied by the classical stool on the third or fourth day, and could not find one in over one hundred hospital charts. The chief difficulty is, as Dr. Winters has said, that the color and nature of these stools has led to misapprehension and a good deal of unnecessary advice concerning weaning.

BACTERICIDAL PROPERTY OF MILK.—J. S. Evans and T. A. Cope (*University of Pennsylvania Medical Bulletin*, November, 1908) have examined milk in the same way that they had studied the bactericidal power of blood serum, sterile milk being obtained by inserting a sterile cannula into the teat after thoroughly cleansing the latter. They conclude that freshly drawn milk possesses a bactericidal activity toward certain microorganisms, and an inhibitory activity toward others. This activity is destroyed at 68° C. and materially injured at 55° C. It varies in different cows and lasts from six to twelve hours. Coagulation and acidity of milk do not depend solely upon the bacterial content. They are influenced by natural properties of milk, which are soon overshadowed by the metabolic products of bacteria. Sterile cow's milk freshly drawn is acid to phenolphthalein and increases very slowly in acidity independent of bacterial metabolism, due probably to the destruction of colostrum cells. Results obtained in testing milk with a mixed bacterial flora are influenced by bacterial antagonism.

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PNEUMOTHORAX: A CLINICAL AND RADIO-GRAPHIC STUDY.

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PART I.

Historical.—Pneumothorax as a clinical or pathological entity was not known to the fathers of medicine. They did not differentiate it from empyema; and it was in the diagnosis of this latter disease that they applied the succussion test. This sign—a splashing sound produced in the chest by shaking the patient—was first described in writings credited to Hippocrates and the procedure is, therefore, frequently called “Hippocratic succussion.” For over two thousand years, until the time when Laennec made his classical contribution to the subject of pneumothorax, the true significance of the succussion sign was not understood. The presence of the splashing sound was thought to indicate a moderate amount of pus in the chest, while its absence was interpreted as indicating a chest filled with pus.

As time passed, the importance of this sign was questioned, and it finally came to be considered as having but little value. The reason is apparent when it is remembered how infrequent is the occurrence of hydropneumothorax as compared with empyema, and consequently how seldom the characteristic splashing sound was heard. Thus it was that Morgagni¹ stated that “this symptom neither is nor can be perpetual,” and he thought it of little value because of its rarity. With the identification of pneumothorax as a distinct entity, the true meaning of the succussion splash was demonstrated, and its value, as a sign of the presence of fluid associated with air, was established.

That pneumothorax remained unrecognized until the nineteenth century is not at all surprising, for it appears that until 1746 it was believed that air was normally present in the pleural cavity. At that time Haller² disproved this view, though a long time elapsed before the correct ideas gained general acceptance.

To judge from the cases reported by Combalusier³ (1747), Meckel⁴ (1759), Ponteau⁵ (1783) and Bell⁶ (1784) the presence of air in the pleural cavity was at that time recognized as an abnormal condition, and from the proposal of Alexander Monro⁷ (1760) and Hewson⁸ (1767) to perform thoracentesis for its removal, it is logical to infer that the ill effects of the air in the pleural cavity were understood at that date. Still, no clear or definite idea of the disease existed until 1803, when Itard⁹ described the condition as found at autopsy and termed the disease pneumothorax. In a crude way he classified the causes of the affection and recognized its relation to tuberculosis. But neither he nor Bayle,¹⁰ who also described the autopsy findings in a group of cases, was able to recognize the condition during life.

Laennec,¹¹ however, in 1819, firmly established the disease as a clinical entity. He was perhaps the first to diagnose pneumothorax during life, and he insisted that this could only be done by means of mediate auscultation and the stethoscope. Though his classification is in some respects erroneous, though some of his cases were not true cases of pneumothorax, and though he failed to note some of the accompanying physical changes, his contribution nevertheless stands as one of the milestones of progress in the art of physical diagnosis.

After Laennec's contribution the subject of pneumothorax received considerable attention and discussion. Numerous cases were reported, and the physical signs were investigated and analyzed. According to Emerson, just as Laennec considered mediate auscultation indispensable in the establishment of the diagnosis, so Poirry¹² (1828) maintained the importance of mediate percussion, while Louis¹³ (1836) and his pupils laid the greatest emphasis on the clinical history regarding auscultation and percussion as unimportant diagnostic methods. It was not long, however, before these discordant claims were harmonized and the importance and the value of each method duly recognized.

In 1830 Reynaud¹⁴ for the first time collected and reviewed all the literature on the subject and gathered 48 cases. Saussier¹⁵ (1841) wrote an excellent thesis and collected 169 cases. Biach¹⁶ (1880) collected the largest number of cases, 485 from literature and 433 from the records of Vienna hospitals, a total of 918. Drasche¹⁷ (1899) reported and analyzed 198 cases which had

come under his personal observation during a period of forty years. Emerson¹⁸ (1903) exhaustively reviewed all the literature upon this subject and reported 48 cases from the Johns Hopkins Hospital. To this latter valuable contribution we desire to express our indebtedness for much of the historical data.

It is surprising to note the little attention this subject of pneumothorax receives in the text books on pediatrics. Pneumothorax is not a rare affection in children. It occurs more frequently than is generally supposed. Holt mentions the condition only in its relation to the pathology of tuberculosis. Koplik discusses it briefly in relation to empyema. Netter and Carr merely comment on its rarity. Rotch, Baginsky, Pfaundler and Schlossman make no mention of it.

It is our purpose to review the subject in a general way to record clinical and radiographic observations and then to discuss the condition with reference to its occurrence in children.

Classification.—Pneumothorax may be produced in any one of three ways: First, by the admission of air into the pleura through a penetrating lesion of the chest wall, the type designated as pneumothorax with an external fistula. Second, by the admission of air into the pleura through a lesion of the lung and visceral pleura or through a communication with a gas-containing organ—pneumothorax with internal fistula. Third, by the bacterial decomposition of a pleural exudate with the formation of gas. When, as in this last variety, there is no communication with the exterior air, a closed pneumothorax is said to exist, in contradistinction to the other variety, in which the air has free egress and ingress, and which is designated as open. The sealing of the fistula either by inflammatory activity or otherwise, may convert a primarily open pneumothorax into a closed one. A peculiar formation of the fistula may permit the air to enter the pleural cavity, but prevent its exit. This is the so-called valvular variety. According to the experiments of Marais and Castlenau²¹ and Lister,¹⁹ a small wound in the lung is always a valved opening which permits the air to travel in one direction only; that is, from the bronchi to the pleura. This was later emphasized by Bard,²⁰ who states that it is impossible in a normal lung (one free to retract or collapse) to produce a fistula permeable in both directions; that is, one which will permit the egress and ingress of air into the pleura.

Causes.—The first variety, according to the classification given, may be produced by stab or gunshot wounds of the chest, by surgical operations, by the accidental admission of air during exploratory puncture and by necrosis of ribs or axillary cellulitis, and, finally, in consequence of the perforation of the chest wall, by a purulent effusion, the so-called “*empyema necessitatis*.” It was recognized early in the study of this condition that not all perforating wounds of the chest will produce pneumothorax, and in Biach’s¹⁶ statistics 21 cases with such wounds are cited in which pneumothorax did not result.

The second variety may result from the rupture into the pleural cavity of a tuberculous, purulent or gangrenous focus in the lung, from perforation of a bronchiectatic cavity, or an emphysematous vesicle or from the laceration of the lungs by fractured ribs. It may be produced by compression of, or severe trauma to the chest without evidence of external wound or fracture. Vigorous and prolonged attempts at artificial respiration may give rise to pneumothorax and subcutaneous emphysema. Any cause, in fact, which produces increased intrapulmonary pressure may result in pneumothorax. Thus it has been caused by the severe coughing paroxysms of pertussis and by the straining of persistent vomiting. It has resulted from the perforation of a foreign body in the bronchus. Ulcerative and suppurative processes in the adjacent organs, liver, stomach, esophagus or intestine may perforate into the pleural cavity.

There is a variety of pneumothorax which has been called “spontaneous” because it occurs in apparently normal individuals without evident cause. In these cases the pneumothorax is rarely fatal. Many observers, among them West,²² deny that the lungs are really normal in such cases and believe that the condition is due either to a latent tuberculosis or to the rupture of emphysematous alveoli. The cases which follow slight exertion, or occur without apparent cause, indicate that in some individuals the lungs because of certain structural peculiarities may be susceptible to rupture. Thus in a case reported by Grenier²³ the pneumothorax recurred three times, in each instance without apparent cause.

Mechanics.—The changes produced in the pleural cavity by the entrance of air, the resulting disturbance in the mechanics of respiration, the position and behavior of the lung under the unusual condition and the modus of the restitution to normal, are

some of the phases of pneumothorax which have been the subject of much investigation and controversy. These questions are still in many respects unsettled. The conflicting observations recorded by various investigators make it difficult to arrive at any correct conclusions. The lungs may be considered as two hollow, elastic and distensible structures communicating freely with the exterior and suspended within a closed and rigid chamber—the thorax. Each lung is enveloped by a serous membrane, the pleura, which is continuous over the inner surface of the chest. In the normal state the visceral and parietal layers are in contact during expiration and inspiration, so that the pleural cavity, as such, may be said not to exist. Because of its free communication with the exterior, the pressure of the air within the lungs varies but slightly from that of the atmosphere. It is, however, exactly that of the atmosphere only at the end of quiet inspiration and expiration. During the act of inspiration, as the capacity of the thorax is increased, the lungs by virtue of their elasticity, are distended and the intrapulmonary pressure falls. An inrush of air through the trachea takes place until the atmospheric pressure is re-established. During expiration, because of the collapse of the chest and the recoil of the lung, the intrapulmonary pressure is slightly increased over that of the atmosphere, and air escapes. Even during the most forcible expiration, however, the elastic tension of the lung is not satisfied; it is still on the stretch. Between the pleural layers there is a pressure less than that of the atmosphere which is referred to as a negative pressure. This negative pressure varies during the respiratory phases and is greatest at the end of inspiration. It has been estimated by Aaron²³ as varying from minus 4.64 mms. Hg. at the end of quiet inspiration to minus 3.02 at the end of expiration.

The forces concerned in the maintenance of the lung in its normal position may be divided into two classes: Those acting from without, which may be styled extrinsic, and those due to properties inherent in the lung tissue itself, which may be called intrinsic. The extrinsic forces consist of, first, the pressure of the atmosphere on the exterior of the chest; second, the pressure of the air within the lungs (intrapulmonary) which, with the variations noted, is that of the atmosphere; and third, the tension which exists between the pleural layers (intrapleural negative pressure). The intrinsic forces consist of, first, the elasticity of

the lung, which constantly tends to diminish the tension under which its structure has been placed; and second, the tonus of the lung, due to its bronchi, muscular and vascular tissue, which maintains the definite structure and shape of the organ.

When air is admitted between the pleural layers, the negative intrapleural pressure is diminished; that is to say, it approximates the atmospheric. The lung may now satisfy its inherent tendency to shrink. But under certain circumstances there is not only no shrinkage, but there may be an actual protrusion of the lung through the wound in the chest wall, constituting a hernia. There are evidently conservative forces which counteract the tendency of the lung to retract. The older writers sought to explain this non-collapse by assuming that a state of cohesion existed between the pleural layers. The resistance encountered when an attempt is made to inject air or fluid into the pleura seemed to give force to this idea. Dolbeau and Smith²⁴ compared this cohesion to that which exists between two opposed wet plates of glass. West²² believed in this cohesive force and estimated it as being equal to the pressure of 12.5 mms. Hg. But other and later investigators (Northrup²⁵ and Emerson¹⁸) have by experiments on animals produced evidence against this cohesion. They have also sought to prove that even the smallest opening of the pleura invariably results in the immediate and complete collapse of the lung, and that under these circumstances the lung takes no part in respiration while the pleural wound is patent. The experiments of others (Hellin²⁶ and Reinboth²⁷) give results which are at variance with these, and demonstrate, on the contrary, that the lungs of animals do not collapse perfectly, even when the pleural opening is the diameter of the trachea, and that the lungs functionate, in the presence of air, in the pleural cavity.

Without attempting to reconcile these antithetical observations, we would insist that it is necessary to be extremely cautious, in the application of the results of animal experimentation in pneumodynamics, to conditions obtaining in human beings; this for several reasons: First, because the anatomical formation of the pleura is different in animals. In the dog, for instance, there is often a communication between the two pleural cavities just above the tendinous centre of the diaphragm, so that nearly every pneumothorax is really bilateral; second, the intrapleural tension is greater in animals; third, the mediastinum is more freely mov-

able in animals. Schrwald²⁸ has shown how the mobility of this structure will affect the condition of both the sound and the affected lung; fourthly, the position of the animal influences the activity of the lung in the affected thorax, and Reinboth²⁷ has furthermore proven that even in the presence of a large opening in the chest wall, if the animal be so placed that the perforation is lowest, the lung will continue to functionate.

These factors undoubtedly influence the experimental results. In their application to human beings, such results should not be permitted to outweigh the information gained by clinical studies. For whatever the experiments on animals may show to the contrary, the following observations remain indisputable, namely, that in human beings pneumothorax does not always result when a communication is established between the pleura and the outside air, that complete collapse of the lung does not usually follow the admission of air into the pleural cavity, and that finally even when pneumothorax is present the lung in the affected cavity usually continues to functionate to a greater or less extent.

In the explanation of the non-collapse of the lung, it is necessary to take into account besides the factors which influence its position (the extrinsic and intrinsic forces), the power of vicarious distention of its alveoli which the lung tissue may exhibit in response to an afferent impulse. The influence also of the size of the pleural wound is important. The integrity of the lung, however, is of greater consequence as affecting the admission of air into the pleural cavity than is the integrity of the chest wall.

When the wound of the pleura is small, that is to say, less than the diameter of the main bronchus to the lung, the tendency of the lung to collapse is counteracted by the compensatory dilatation of parenchyma, in the immediate vicinity of that portion subjected to the stress of the atmospheric pressure. This increase of the pulmonary volume, associated as it is with increased intrapulmonary tension due to increased respiratory activity, is sufficient not only to maintain the approximation of the pleural layers, but when there is added the expiratory pressure from the sound lung, an actual protrusion of the lung tissue into the parietal wound may take place. One condition, however, must be present in order that this may transpire, and that is, the lung must be uninjured and not diseased.

When the opening into the parietal pleura is a large one, air

enters the cavity with each inspiration, and the lung shrinks to a corresponding degree. It does not, however, collapse to the same degree as if the wound were in its own tissue. Redistention takes place as soon as the parietal opening becomes smaller through the agency of the same forces as mentioned above, except that the expiratory pressure from the sound lung plays a more important part. The lung continues to take an active part in respiration, but its movement differs from that of the sound lung; that is, it expands with expiration and collapses with inspiration. As the fistula closes the type of respiration changes, and when the size of the opening becomes less than that of the bronchus the normal type again prevails.

When the lung and pulmonary pleura are injured and there results a pneumothorax with internal fistula, the degree of lung retraction will depend upon the size and form of the perforation, on the size and condition of the bronchus leading to the affected parenchyma and on the condition of the lung. Cases are on record in which perforation of normal lungs did not result in pneumothorax. As a rule, however, despite evidences of reparation, as shown by localized atelectasis by the dilatation of the adjoining parenchyma and by the increased expansion, the air nevertheless escapes into the pleura. As has been pointed out previously, because of the localized atelectasis, the fistula permits the air to enter into the pleura, but prevents its egress, and thus the negative pressure of the pleura is rapidly lowered or changed to a positive one. It is this positive pressure which indirectly gives rise to the oppressive symptoms, but which at the same time effectually aids in the closure of the fistula and thus initiates the reparative process. If, however, because of disease of the lung or the presence of pleural adhesions, the collapse of the lung is prevented, or if the situation of the wound be such as to expose a bronchial opening, then the exit and entrance of air into the pleural cavity is free and restitution to the normal is delayed.

Effect on Lung.—The air entering the pleura may first be confined by adhesions to a particular part of the chest, and only later occupy the entire cavity. This frequently occurs in pneumothorax due to rupture of a tuberculous lung. As the air enters, the lung collapses as a whole toward its root, the force of the positive pressure acting upon every part of the periphery and compressing the lung toward this point. Garland,²⁹ from ob-

servations upon dead dogs, claims that the base of the lung retracts first, and only after this part ascends for some distance do the other parts collapse. Experimental pneumothorax, as studied with the Roentgen ray, shows that in the living animal the air rapidly diffuses from its point of entry over the entire pleural



FIG. 1—PNEUMOTHORAX—RIGHT.

- (L) Collapsed lung lying about its root.
- (A) Pleural cavity containing air—brilliantly illuminated.
- (H) Heart displaced to the left.
- (N) Normal lung.
- (D) Diaphragm. Note its sharp outline on the right side indicating immobility.
- (S) Scapula. Note the difference in density of the ribs' shadows of the right and left chests.

cavity, and that this primary retraction of the base does not take place, but that every part collapses simultaneously. The position of a collapsed lung in a pleural cavity free from adhesions is al-

ways at its root. From this site, if the perforation is small, the lung may be observed to expand from its shrunken condition to take part in the respiratory movements. When, however, the perforation is large and the lung is the seat of disease, the collapse of the lung is usually total and the lung lies against the spinal column as a shrunken mass. Adhesions may permit only part of the lung to collapse, and examination with the Roentgen ray of a recent case will show that during respiratory movements the adherent area expands with inspiration, following the pull of the chest, and shrinks with expiration; it is only with forced expiration, however, that the collapsed portion dilates to any extent. With the healing and closure of the fistula, the affected lobe begins to follow the movements of the chest.

Effect on Diaphragm.—The diaphragm is depressed to a varying degree. Its dome is flattened and its movements are inhibited. In many cases the tone is entirely lost and the diaphragm passively follows the pressure changes in the abdominal cavity, rising with inspiration and sinking with expiration. In cases where massive collapse of the lung persists for some time, the diaphragm may so entirely lose its tone as to sag into the peritoneal cavity. The limitation of the motion of the diaphragm in pneumothorax, as well as in incipient tuberculosis, is not due to any intrinsic affection of this part, but entirely to the loss of the supporting power of the lungs. The loss of tone of the diaphragm results in bulging of the lower chest and widening of the intercostal spaces. This distension is no indication of increased pressure within the pleural cavity, but simply an index of the extent of the paresis of the diaphragm and the intercostal muscles.

Effect on Heart.—The mediastinum and its contents may be considered as a movable body, whose position depends upon the surrounding forces. Any change in the intrapulmonary or intrapleural pressure will disturb the equilibrium and affect its position. When the normal negative pressure is lowered by the admission of air, the heart and great vessels will be displaced in the direction of least resistance, and will thus be pushed away from the affected side. The displacement is greater in children than in adults. The displacement is also greater when the left pleural cavity is involved. In these cases, the heart within the right thorax, the distorted aorta and the stretched blood vessels makes a very striking fluoroscopic picture. The position of the heart

serves as the best index of the amount of air in the pleural cavity. Recovery can only be considered complete when restitution of this displaced viscus has taken place.

Hydropneumothorax.—A not infrequent complication of simple pneumothorax is the accumulation of fluid within the affected

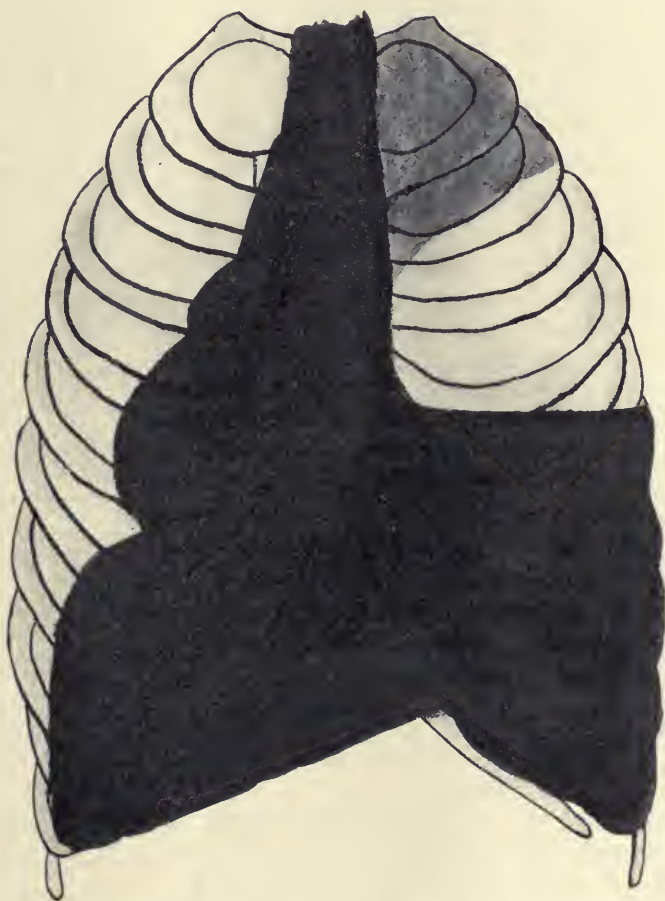


FIG. 2.—Diagram of pneumohydrothorax, as shown by Roentgenoscopy. Left side. Upright position. Ventrodorsal view. The three zones are shown. The shaded upper corresponding to the compressed and collapsed lung; the bright middle indicating the air; and the dark lower indicating fluid. This shadow merges with that of the liver below. Heart displaced to the right. The perfectly horizontal line of the upper level of the fluid is shown.

pleura. It has been estimated that but 10 per cent. of all cases are free from this complication. The development of an effusion depends to a great extent upon the condition of the pleura and

lung prior to the admission of air. If these organs are the seat of an inflammatory condition, the occurrence of an effusion is to be expected, while pneumothorax in a previously healthy pleura may go on to restitution without effusion. According to West, the fluid is serous, sero-purulent and purulent in an equable division of cases. In children, purulent effusion is a very common occurrence. It is unusual for a serous effusion to change gradually to a purulent one. The organisms in the fluid are usually those associated with the primary disease. In perforating wounds the infecting organism may be introduced from without. In the case of May and Bebbard³⁰ the infecting organism was the colon bacillus introduced through a stab wound.

When fluid accumulates in a pleural cavity containing air, the physical conditions, as viewed by means of the Roentgen ray, are different from those of simple effusion. In ordinary exudative pleurisy the upper level of the fluid appears concave, rising higher at the sides and more so at the outer than the inner, while a change in the position of the thorax has but little effect on this level. In the presence of air, however, the upper surface is horizontal (Fig. 2); the level changes freely with the position of the thorax, but always remains horizontal. Moreover, the fluid is affected by every movement of the body. Thus the rise and fall of the level corresponding to the respiratory movements, the undulations synchronous with the systole and diastole of the heart, the agitation of its surface when the chest is percussed or during coughing, and the waves produced by the more forcible succussion are all phenomena to be observed with the fluoroscopic screen. When moderate in amount the level of the effusion rises with inspiration and falls with expiration—a reversal of what should normally occur. This paradoxical condition is due to the loss of tone of the diaphragm, whose movements become altogether passive and follow the abdominal pressure changes. In the same way as the abdominal wall moves forward with inspiration, so the diaphragm is pushed upward in that phase. When the fluid is considerable the diaphragm may become inverted and so weighed down that the level of the fluid is not appreciably affected by the respiratory movements.

In the presence of air the upper limit of dullness does not indicate the level of the fluid. The low tone of the note is vitiated by the tympanitic resonance due to the presence of air. It has

been stated as axiomatic that in these cases the amount of fluid will be double that indicated by the line of dullness (Skoda³¹). Thus in a case of Senator's, Weil³² states that the chest was hyperresonant to the twelfth rib even after 800 c.c. of a medicated solution had been added to the fluid already present. A small amount of effusion cannot be made out by the usual methods of examination. The predominating pathological condition will determine the signs which it is possible to elicit. Thus in the presence of considerable gas even a moderate effusion may escape detection, while a small amount of air associated with much effusion will but rarely be diagnosed. The Roentgen ray examination will render considerable aid in these cases, for even the least effusion in the costodiaphragmatic sinus may easily be made out either by the fluorescent screen or on the photographic plate. (Fig. 3.)

Subcutaneous Emphysema.—Subcutaneous emphysema may be a complication of pneumothorax due to exploratory puncture, incision of the chest wall or trauma with or without evidence of fracture or rib. The emphysema may in some instances appear in the tissues of the neck before the air gives evidence of having entered the pleural cavity. This is brought about by the extravasation of air beneath the temporarily intact visceral pleura. From there the air dissects its way into the mediastinal tissues and then into the neck. Later the pressure may cause perforation of the visceral pleura. Such were the events in a case reported by Steffen⁷⁹ resulting from the fracture of a rib. Before the importance of pneumothorax was recognized, subcutaneous emphysema interested the early observers, who ascribed the symptoms of the former disease to its complement or complication subcutaneous emphysema. Ambroise Pare³³ (1628) was perhaps the first who recorded observations upon the presence of air in the subcutaneous tissues, resulting from fractured ribs. As a rule, emphysema, when a complication of pneumothorax, does not add to the gravity of the case. Perrin³⁴ directs attention to the fact that subcutaneous emphysema, following puncture of a pneumothorax, may be a serious complication. The emphysema may become general and require incision or a cellulitis may be set up, if a pleurisy be present. The prognosis, however, is not always grave, and 2 cases are reported in which recovery took place. In both, the emphysema was produced accidentally in thoracentesis. The puncture

wound acted as a safety valve compensating for the continual accumulation of air in the pleural cavity, by evacuating it into the cellular tissues, where it was absorbed. In a case reported by Bovaird⁴⁰ the chest of a child of three years, with left pneumothorax, was punctured. Subcutaneous emphysema followed, which spread over the entire body. It is interesting to note that



FIG. 3—PYOPNEUMOTHORAX—RIGHT. (VENTRODORSAL VIEW.)
RECUMBENT POSITION.

- (AE) Air and fluid in the right pleural cavity.
- (L) Shadow of collapsed lung faintly visible owing to the superimposed shadow of fluid which, because of the recumbent posture, flows over the posterior wall of the chest while the air rises above it.
- (H) Heart displaced to the left.
- (NL) Lung on the left side in a state of compensatory emphysema.
- (D) Diaphragm.
- (C) Costo-diaphragmatic space of right side clearly outlined. Compared with appearance of space on diseased side which contains fluid.

the air in the subcutaneous tissues is absorbed more rapidly than in the pleura. It requires from three to seven days for the air to disappear from beneath the skin, while in the chest it may persist for three or four weeks, or even longer.

Composition of Air in Pneumothorax.—The chemical compo-

sition of the air in the pleural cavity may become changed in consequence of secondary infection or absorption of some of its constituents. The composition of the gas in cases due to the decomposition of the pleural exudate will depend upon the nature of the infecting organism. The most frequent infecting germs are the bacillus coli communis and the bacillus ærogenes capsulatus. In the recorded cases in which the development of gas from decomposition of fluid was supposed to have taken place, paracentesis had been performed, and it is not improbable that the organism may have been introduced in this manner.

Absorption of Air.—That the pleura possesses the power of absorbing gases has been proven by animal experiments and observations on human beings. J. Davy³⁵ (1823) was one of the first to experiment with the absorptive power of the pleura. Pure oxygen is absorbed more readily than nitrogen, while CO₂ and O were absorbed at about the same rate as air. The relative quota of CO₂ in the air which enters the pleura, becomes rapidly greater than that of the atmosphere. More CO₂ is also present if there is an accompanying purulent effusion. The absorption is retarded in the presence of any inflammatory condition of the pleura or lungs. The air disappears more rapidly in children than in adults. The rapidity of absorption varies within wide limits, though it is not unusual for it to be completed in from four to eight weeks. Fowler and Godlie³⁶ state that a quantity of air sufficient to give a tympanitic note over half of the chest completely disappeared in three days. In a case reported by Aron³⁷ of a man with emphysema, who developed pneumothorax from inhaling hydrochloric acid fumes, the gas was absorbed in four weeks. In some of the reported cases it has, however, taken months and years before absorption was complete.

Pneumothorax as a Therapeutic Measure.—Since Houghton's observations (1832) of the apparently favorable influence of pneumothorax upon the progress of pulmonary tuberculosis, this phase of the subject has been a matter of much controversy. Such excellent clinicians as Stokes, Saussier, West and Walshe have failed to observe any distinct definite or lasting improvement. Potain³⁷ (1888) was the first to recommend the introduction of sterile air after the removal of the exudate. He believed that this immobilized the lung and favored cicatrization and cure. Forlanini³⁸ (1894) produced pneumothorax in 2 tuberculous cases with

nitrogen gas, and claimed satisfactory results. Murphy⁸⁹ recommended this procedure in unilateral tubercular involvement.

Pneumothorax in Children.—Pneumothorax, though quite a rare disease in children under three years, is not rare in older children. It may occur in the newborn as a result of trauma. Thus Ruge³⁸ reported the case of an infant who was born asphyxiated. After resuscitation, it cried lustily during the night, but the next morning became cyanotic and died. The autopsy showed left pneumothorax, the pleural cavity also containing a little blood. It was supposed that there had been a rupture of the alveoli, interstitial emphysema, and finally, rupture of the pleura, and that the condition was due to the violent crying, but from similar cases, which have come under our observation, it appears reasonable to suppose that the efforts at resuscitation played an important part in its production.

James³⁹ refers to a case reported by Money which occurred in a child of three months. Bovaird⁴⁰ reported the autopsy record of a case of pneumothorax due to rupture of a small abscess in a child of four months.

Etiology.—In the order of their frequency, the causes of pneumothorax may be stated as follows: Tuberculosis, gangrene, trauma, empyema, foreign bodies and abscess. Pneumothorax frequently complicates those infectious diseases in which bronchopneumonia is a prominent feature, namely, measles, pertussis and diphtheria. It is but rarely due to suppurative processes in the stomach, esophagus, liver or vertebra. The accompanying and basic pulmonary condition is usually a secondary bronchopneumonia. Measles, bronchopneumonia and pneumothorax is a frequent example of the march of events. The perforation may be due to the rupture of a cavity, a purulent process, an emphysematous bleb or to the softening of an infarct.

Tuberculosis.—While in adults at least 80 per cent. of the cases of pneumothorax are due to tuberculosis, in children not more than 40 per cent. are due to this cause. Of this 40 per cent., the vast majority of the patients are beyond the age of four years. It has been estimated that about 1 per cent. of the cases of pulmonary tuberculosis in children develop this complication. Of the 35 cases reported by Lentz,⁴¹ 14 were due to this disease; and of the 31 cases collected by Chrzanewska,⁵¹ 12 were due to tuberculosis.

One of the earliest recorded instances of tuberculous pneumothorax in a child was reported by Leas.⁴² The patient was a girl, two years old, and the pneumothorax was due to the rupture of a tuberculous cavity of the left lung. Sevestre reported a case in an infant of sixteen months due to rupture of a tuberculous cavity. Pollock⁴³ reported a case due to a similar condition in a child of three and one-half years, in whom tuberculosis had not been suspected. Parks,⁴⁵ West,⁴⁴ Nichols,⁴⁸ Rilliet and Barthez,⁴⁶ Seiffert,⁴⁷ Gailliard,⁴⁹ Revilliod,⁶⁰ Steffen,⁷³ Cozzolino,⁵⁰ and Leconte⁶⁰ have recorded cases due to tuberculosis. The perforation usually occurs during the active stage of the disease and may be due either to the rupture of a caseous deposit or a cavity. The latter process is but rarely found in infants. The perforation is not always found within the area of the most extensive disease, and is seldom found at the apex. This is due to the protective influence of adhesions. The left side is more frequently involved, and the perforation is found more often in the lower lobe than in the upper. The perforation is, as a rule, very small and difficult of detection. Tuberculous pneumothorax usually terminates in a pyopneumothorax.

Gangrene.—Gangrene of the lung is more frequently a cause of pneumothorax in children than in adults. The gangrene may be secondary to pneumonia, bronchiectasis or thrombosis. Lentz⁴¹ mentions 11 cases due to this condition in a series of 35 cases of pneumothorax. Zuppinger⁵² reported 3 cases of pneumothorax due to gangrene of an infarcted area in the course of diphtheria.

Traumatic Pneumothorax.—That pneumothorax may result from trauma of the chest without any evidence of fracture was recognized as early as 1757 by Hewson.⁸ Traube⁵⁴ was among the first to make a contribution to this subject. It has been suggested that in these cases the injury is produced by a greenstick fracture of the rib, which rights itself when the pressure of the traumatic force is removed. This explanation probably applies only to children. It is also well known that an increase in the intrapulmonary pressure, such as may occur in compression of the chest when the glottis is closed, may result in rupture of the lung and pulmonary pleura. Many such cases have been reported in children. Hematothorax is not infrequently present in these cases. Among the cases recorded in which pneumothorax was produced by trauma without fracture or wound of chest are the following:

Curling⁵⁵: Boy, thirteen years, was run over. Left pneumo-

thorax resulted. No fracture or external injury could be found.

Butlin⁵⁶: Child, six years, was run over. Left pneumothorax resulted and recovery took place in six weeks. No fracture or external injury was found.

Gould⁵⁷: Child, six years, was run over. Left pneumothorax developed two days later. Chest returned to normal one week after aspiration of air. No fracture or external injury found.



FIG. 4—TRAUMATIC PNEUMOTHORAX.

- (L) Partially collapsed lung lying at its root in the middle and posterior part of the right chest. Its three lobes can be made out. The upper extending to the fifth rib, the middle between fifth and sixth, and the lower from this point to the ninth. The arrows are one below and one above the middle lobe.
- (A) Air in the right pleural cavity surrounding the lung.
- (C) Costo-diaphragmatic space clear, showing no effusion.
- (H) Heart displaced considerably to the left. The right and posterior border is seen at the mid-vertebral line. The portion of this right heart percussable was therefore to the right of the sternum.
- (D) Diaphragm.
- (S) Scapula.

Lucas⁵⁸: Boy, two years, after trauma developed right pneumothorax. Recovery took place in twenty-six days. There was no evidence of fracture.

The following case, which we were permitted to study through

the courtesy of Dr. Henry M. Silver (Attending Surgeon to Beth Israel Hospital), belongs to this category:—

Hyman T., native of United States, four and one-half years old, was admitted to Beth Israel Hospital, November 27, 1907. About 4 P.M. of the day of admission he was run over by a truck. He was picked up in a fainting condition. On regaining consciousness he expectorated and vomited some blood. There was no hemorrhage from either nose or ears. There were no evidences of pain. The general condition of the child was bad. There was marked dyspnea, a feeble, thready pulse, the skin and mucous membranes were cyanotic, the peripheral circulation was poor and there was considerable shock. At 9 P.M., pulse 142, respiration 62, temperature, 100.4°. Examination showed some slight discoloration of the skin over the right anterior chest, but failed to disclose any wound or any fracture of the ribs. The right chest gave all the signs of pneumothorax. The heart was considerably displaced to the left and its impulse was very feeble. Fluoroscopic examination showed the lung lying in a partially collapsed state at its root. It was motionless, except during forced expiration or coughing, when it was seen to dilate to a moderate extent. The diaphragm rose during inspiration and sank with expiration and its movement was sluggish.

For a week the condition of the child was precarious. The pulse varied from 112 to 190. The temperature was moderately elevated and fluctuated irregularly. During the second week the patient began to rally and the improvement henceforth was progressive. Ten days after the accident fluoroscopic examination showed a condition similar to that in Fig. 4. The contracted lung was seen in the middle and posterior part of the right chest, surrounded by air. During inspiration the lung could now be seen to expand from its partially shrunken state and to fill the chest cavity almost completely. With expiration, it would collapse rapidly to its root, the shrinking being of equal extent in all parts. The diaphragm on the affected side moved slightly. No fluid was visible. The patient was discharged three weeks after admission in excellent condition, with no respiratory difficulty; nevertheless, the radiograph at this time showed that there still was some air present in the affected cavity, and that the heart had not yet returned to its normal position.

(The second part will appear in the April ARCHIVES.)

THE REGULATION OF FAT PERCENTAGES IN INFANT FEEDING.

BY A. S. BLEYER, M.D.,

St. Louis.

In the light of recent changes in the fundamental principles upon which infant feeding is based, the rôle of the fats has assumed a position of unexpected prominence. In the following observations which were made in the feeding of 600 babies, the subject of the fats has received especial attention; the feeding in each case was carried on by written instructions explained to the mother.

(1) In considering *the influence of the fats upon the appetite and intervals of feeding*, it is found that if the fats are reduced to minus 1 per cent., the child becomes hungry, regardless of a reasonable increase in proteids. This may be due to the extreme smallness of the proteid curd as compared to the tough, bulky mass which is formed when a great number of fat globules are entangled in the curd.

The following case illustrates this point: Baby M. was receiving 3 per cent. of fats and would not take more than four feedings a day. The fats were removed and the proteids were doubled. He promptly became hungry and gained 12 ounces in a week. He was now vigorously consuming about 300 calories per day more than he required, the energy-quotient of his food having been raised from 45 to 78 per pound.

This striking effect of fat-free feeding on the appetite was seen whenever tried. It seems that it can always be looked for except in the face of grave nutritional or digestive disorders.

As for the influence of the fats upon the intervals of feeding, I have found it a rule of great practical value to decide the frequency of feedings upon the percentage of fat present in the mixture. If the fats are removed, a normal child will be hungry in about an hour and a half. For example: Baby K., at two months, was ravenously hungry every two hours on a fat-free mixture, while Baby G., at the same age, was fed on breast milk

containing $5\frac{1}{2}$ to 6 per cent. of fats and was satisfied on five or six feedings in twenty-four hours, both babies gaining normally.

The conclusion therefore seems warranted that the removal of the fats exerts a remarkable influence on the appetite, and that the intervals of feeding depend in great measure upon the percentage of fat present in the mixture.

(2) *The influence of the fats upon vomiting.*—In an infant, who is vomiting massive curds, it is the universal custom to reduce the caseins or to alkalinize the milk. Judging from the fact that an acid medium such as the gastric juice will promptly precipitate albumins, it has been believed that the high proteid percentages found in cow's milk must be the elements which produce these curds, and that by reducing the proteids or neutralizing the acidity of the gastric juice their precipitation would be delayed and the formation of the massive curds prevented. Experience the world over has shown that most excellent results in practice could be obtained by this plan of alkalinizing the milk, and it was in this way that the so-called "casein curd" became recognized as the great stumbling block in the feeding of infants. The casein curd was considered to be insurmountably indigestible by weak infants, and all percentage methods which have played so prominent a part in feeding, especially in our country, owe their conception most largely to the assumption that it was the casein of these curds which could not be digested by the infant. To this assumption may be traced the delicate percentage methods advocated by Rotch and the milk-modifying plants known as Walker-Gordon Laboratories formerly considered so essential to proper feeding.

To study this point, a series of vomiting babies was selected in whom the citrate of sodium had promptly controlled the vomiting. The fats were removed from the milk and the citrate of soda discontinued. The vomiting did not recur in a majority of cases. I concluded therefore that if the rapid precipitation of caseins produced vomiting in the presence of fats, that it did not often do so when the fats were removed, and that it was not the caseins so much as the fats which were responsible for the vomiting.

Laboratory investigation now revealed that if whole milk is precipitated, over 60 per cent. of the curd by bulk is fat. This can readily be determined by comparing a whole milk curd to the curd formed when the fats have been removed. Furthermore, the curd containing fat has distinctive characteristics. It is tough, leath-

ery and tenacious, and the microscope readily shows the myriads of fat globules entangled in the mesh-work of the precipitated casein. On the other hand, the true casein curd precipitate, has very distinctive characteristics, which vary however with the reagent used. For example, with acetic acid, hydrochloric acid or phosphotungstic acid, the curds form a compact magma. With tannic acid they are gelatinous; with bichloride of mercury they are gritty or sandy and very minute, while with formalin they acquire a stony hardness. In any case the simple casein curd without any fat in it is never leathery or tenacious, and it is not bulky.

I therefore came to the conclusion that the caseins offer little difficulty in the vomiting of babies provided the fats do not interfere, and concluded that the teachings concerning the formation and indigestibility of casein curds were not correct. These observations were reported to the Bethesda Pediatric Society in September, 1908, and have since been repeatedly confirmed.

(3) We now come to *the influence of the fats upon the character of the stools and upon constipation*. The opinion seems to be generally abroad that babies fed on low fat percentages suffer from constipation. I therefore wish to report 28 records kept on this point, in 20 of which there was at least one stool every day. A number of these babies had diarrhea. Aside from these records, I have observed that it is usual to see two or more stools daily in children who receive low fat percentages.

In a few of the diarrheal cases a foul odor of decomposition was present in the stool. This odor was at first attributed to putrefaction of the ingested proteids. Recently, however, the investigations of Feer and Finkelstein insist that these foul smelling stools are due to putrefaction of mucous and intestinal secretions, and have nothing to do with the proteids ingested. These authorities have also shown that practically none of the proteid ingested is to be found in the stools. It was found that a child taking nothing but a sugar solution or a mixture of whey and fat will have practically the same percentages of proteid in the stools as is found when proteids are administered, the proteid in the stools being derived from the nucleoproteids of the bile and intestinal secretions.

SCARLET FEVER PROPHYLAXIS WITH STREPTOCOCCUS VACCINE.*

BY RICHARD M. SMITH, M.D.,

Boston, Mass.

There has been considerable work done in Russia on the immunization of patients against scarlet fever by the use of streptococcus vaccine, but thus far little or no attention has been paid to the subject in this country. Whether it is believed that the streptococcus is the real cause of the disease or not, the use of the vaccines, provided the results are satisfactory, may still be continued. The work was first undertaken by, and has largely spread through the influence of, Gabitschewsky.

He used a concentrated bouillon culture of the streptococcus isolated from a person ill with scarlet fever, killed by heating to 60°C., with the addition of 0.5 per cent. carbolic acid. The dose was 0.5 c.cm. in children two to ten years old, modified from this according to age. The contraindications for use are nephritis, very young or greatly exhausted individuals and possibly high temperature. It is claimed that after three doses of the vaccine, given at seven to ten day intervals, a complete immunity is established against scarlet fever. The duration of this immunity is, of course, a matter of speculation, but is believed to remain at least one and a half years. In the majority of cases there is some local reaction at the site of inoculation, consisting of a small area of redness and infiltration with some pain and tenderness lasting one to three days. There is usually also a little rise in temperature, some headache, and general malaise. In from 10 to 15 per cent. of the cases, twenty-four hours after the injection, there appears on the chest and abdomen a punctuate erythema very much like the eruption of scarlet fever, but not followed by any desquamation. This eruption lasts one to three days and may be accompanied by sore throat, some swelling of the lymph glands and often the so-called strawberry tongue. After the first injection the reactions are very slight, if any.

Smirnoff reports its use in a small village where no quaran-

* Read at the Ninth Meeting of the New England Pediatric Society, January 29, 1910.

tine precautions were observed. There were 34 unvaccinated children, of whom 24, or 70 per cent., had scarlet fever. There were 48 vaccinated children, of whom 4, or 8.3 per cent., had scarlet fever, and these 4 came down too soon after the injection for immunity to have been established. In another village there were 45 uninoculated, of whom 6, or 13.3 per cent., had scarlet fever; there were 56 inoculated, of whom 1, or 1.77 per cent., had scarlet fever. Altogether, he vaccinated 455 cases, only 7 of whom had the disease. In villages where there was no vaccination 20 per cent. of the children contracted the disease, 11.1 per cent. of these died, while in the villages with vaccination only 3.7 per cent. had scarlet fever and there were no deaths.

Yemelyanoff worked in the midst of a severe epidemic, and none of the 610 cases vaccinated contracted the disease. This is particularly significant because nearly every house in the district was infected and there was no quarantine.

Zelikin used vaccine in a country district where there was a severe epidemic, and of 613 cases vaccinated only 4 had scarlet fever, and all these had had but one inoculation.

Nikitin vaccinated 528 children, of whom 8 had scarlet fever, and all of these had had but one injection. In the villages not vaccinated, 16 per cent. of the children had the disease.

Many other similar results may be cited; in all over 50,000 vaccinations have been made. From these accounts it would seem that:—

(1) Streptococcus vaccine has some influence in controlling epidemics of scarlet fever.

(2) Their use, with proper care, is attended by no harmful results.

(3) They should be given wider application in this country to prove or disapprove the contention of the Russian physicians.

CLINICAL MEMORANDA.

A SPECIMEN OF FORMED MECONIUM SIMULATING INTESTINE.*

BY ROWLAND G. FREEMAN, M.D.,
New York.

A year ago I was called in great haste to see a case in consultation with a physician who told me that he had delivered a woman of a healthy baby that morning; that the baby's bowel had since protruded from the anus and that it was turning black. On inquiry he replied that otherwise the child was apparently in perfectly good condition.

On reaching the case I found a robust looking baby, and as the doctor had said from the anus there protruded a cylindrical coil of dark material with a shiny surface about one-half an inch thick and some eight inches long, having the dark greenish-brown color characteristic of meconium, one free end telling the story that it was not intestine.

On very gentle manipulation close to the anus, this mass was separated, which proved to be simply formed meconium consisting of the ordinary material of meconium, desquamated epithelium, and bile with a dried mucous covering.

A specimen of this somewhat distorted by having soaked in fluids for a long period and a photograph of a portion of it will give some slight idea of its appearance.



Figure showing how formed meconium gave the appearance of gangrenous intestine.

* Read before the Twenty-first Annual Meeting of the American Pediatric Society, May 27, 1909.

A CASE OF INFECTIOUS PURPURA.*

BY SIDNEY J. REPPLIER, M.D.,

Assistant Dispensary Physician to the Children's Hospital, Physician to the
Pennsylvania State Tuberculosis Dispensary, etc.

The patient, Wm. Q., age nineteen months, was brought by his mother to the surgical dispensary of the Children's Hospital on October 16, 1909, with suppuration of the left anterior cervical lymph nodes. One was opened at that time and drained and about a dram of pus obtained. A second node, containing a smaller quantity of pus, was opened a day or so later. On October 20th the baby had a temperature of 104°F ., was coughing and the chest was full of moist râles. He was referred to the medical clinic, where a provisional diagnosis of bronchopneumonia was made. As there was no room in the hospital, the mother was told to have the baby treated at home. He was seen by me on the evening of the same day. At that time his head was encircled by a bandage running from chin to crown and covering the ears. At the edge of the bandage and covering the half inch or so of space between the bandage and the left eye, the skin was red, shiny and indurated and there were several irregular vesicles. I made a diagnosis of erysipelas and told the mother to apply compresses of a saturated solution of mag. sulph. continuously. I ordered, in addition, 20 minims of Basham's mixture *t.i.d.* By the next day the eruption had spread over the left eye to the mid-line and involved part of the left cheek. Temperature, 105°F . The wound was dressed on that day. Two days later, on October 22d, the eruption involved both eyes, the nose, all the left and the upper part of the right cheek, and was extending into the hair. The redness had left the site where it first appeared, but the whole face was still puffy and the patient could not see out of his eyes. The wounds had healed very rapidly and there was only a small amount of discharge from the last one opened. Temperature, 103°F . On the day following, October 24th, the baby vomited several ounces of blood. At that time he lay on his side with his head thrown back and cried when he was touched. The eyelids were so swollen that the pupils could not be examined. Kernig's sign was absent. Temperature, 101°F .

On the 25th of October, the redness had disappeared from the

* Read at a Meeting of the Philadelphia Pediatric Society, December 14, 1909.

face and hair, except over the occiput. The baby threw his head backward, but did not seem so irritable. On that day there was noted for the first time an area of ecchymosis on the outside of the left buttock, about the size of a dollar. Temperature, 100°F. Two days later the ecchymosis had extended all the way down the left leg and had appeared on the right buttock. The baby was quite pale. The retraction of the head was very marked and the child cried when moved. There was still a small area of erysipelas on the back of his neck. Kernig's sign was still absent. Pupils were not examined. The next day the right leg was completely ecchymotic and it was extending up on to the abdomen. From the left thigh and buttock a pinkish serum exuded through the pores. The child had a waxy pallor as if from a severe internal hemorrhage. He was quite stuporous and did not cry when moved. He died that day and autopsy was refused.

I called the case one of infectious purpura hemorrhagica, following erysipelas, with cerebral, gastric and subcutaneous hemorrhages. In looking over the literature as well as I was able, I could find no reference to a similar case. The infectious character of purpura has, of course, been recognized for some time. Krug Kula,¹ in 1873, pointed this out, and as proof he cited the case of a scorbutic nursing mother giving scurvy to her twins. Numerous observers have found organisms in the blood of these individuals, among the best of the writers on the subject being Letzerich.² In his monograph on the subject, written ten years later, he tells how he isolated an organism resembling the anthrax bacillus from the blood of a patient. This caused hemorrhagic manifestations when injected into guinea pigs and he recovered the organisms from their blood. Two years later he developed purpura, and he isolated the same organism from his own blood. His opinion was that he had infected himself during his previous experiments and that the bacillus had lain dormant, waiting for favorable conditions to develop.

Schram,³ in 1902, reported a case of primary purpura with an absolutely negative previous history, who died after a four weeks' illness. He had submucous and subdermal hemorrhages, bleeding from gums, swollen joints and left-sided facial paralysis. There was a systolic thrill at the apex with a soft murmur. A louder murmur was heard at the base. A pure culture of staphylococcus aureus was found antemortem. Autopsy showed nothing on the heart valves and no source for the infection.

Jackson⁴ reported the case of a child, five years of age, who had had an attack of measles in the latter part of May and had recovered. On June 12th, without any previous ill health, except the measles, a few hemorrhagic spots were noted on the legs. They increased rapidly in size and number and were accompanied by bleeding from the bladder, intestines, stomach and nose. There was no evidence of intracranial hemorrhage. Autopsy was refused.

No blood culture was made on the case here presented, but the connection between the erysipelas and the purpura seems sufficiently well established.

4521 Chester Avenue.

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 2. Letzerich, Untersuchungen über die Kenntniss der Purpura Hemorrhagica.
 3. Schram and Rubovits, Philadelphia Medical Journal, August 16, 1902.
 4. Jackson, ARCHIVES OF PEDIATRICS, 1890, Vol. VII., p. 951.
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CONDITION OF THE BLOOD IN EXPERIMENTAL RICKETS. (*British Medical Journal*, May 15, 1909.) Findlay investigated 30 cases of active and uncomplicated rickets in children between the ages of twelve and forty-two months. In only 9 of these cases was there any degree of anemia, and in 2 of these the hemoglobin was only 5 per cent. below the average, and in no instance was the number of red cells less than 4,100,000. Nucleated red blood corpuscles were found only once. The leukocytes were moderately increased. The differential count failed to reveal anything characteristic. In order to corroborate these findings, the writer induced rickets experimentally in young dogs. When the rachitic manifestations became very marked the animals were killed and the blood was carefully studied. As a result, he has found that experimental rickets is not necessarily accompanied by any anemia, and when anemia does appear it is as a rule of minor degree and may frequently be accounted for by some complication. There may or may not be a leukocytosis; but this also, when it occurs, may be the result of some complication. It can at least be truly said that in the blood of animals suffering from rickets there is no marked pathologic change and absolutely nothing characteristic.—*Boston Medical and Surgical Journal*.

EDITORIAL.

MEDICAL SOCIETY MEETINGS.

The value of the well-conducted medical society meeting is plainly apparent. One realizes the profit gained in increased breadth of view, and in new knowledge, acquired from the papers read, the cases presented and the discussion evoked. The mere contact with fellow practitioners has in itself a stimulus to equal their achievement or to avoid their mistakes. No mere reading of a medical article can equal its adequate presentation by the man who has done the work. The eyes tire on the printed page and the overworked brain often gives way to slumber; whereas, when the ears do the brunt of the work and the critical sense is sharpened by the possibility of having to discuss the paper, the mind becomes alert and wide awake. A poor meeting, however, where attendance is slim, the papers poor, their presentation careless, is about the worst extravagance that the time-poor medical man can indulge in.

It is with the idea of giving wider knowledge of the experience of the Philadelphia Pediatric Society, perhaps the largest and best organized pediatric body in this country, that we publish Dr. Gitting's presidential address, hoping that the excellent counsel which it contains may be of help to pediatric societies throughout the country in making their meetings stimulating and productive.

A REGISTRY FOR WET-NURSES.

We wish to draw the attention of the readers of the ARCHIVES to the notice given to the New England Pediatric Society at its recent meeting,* of a proposed registry for wet-nurses.

It has been a matter of increasing difficulty during the past few years to obtain enough wet-nurses to supply a demand which seems to be growing greater in spite of the increase in the number of mothers who are able to nurse their babies and the further elaboration of facilities for artificial feeding. In cities where there are wet-nurse agents, these agents themselves say that it is due to the fact that the wet-nurse, even though she receives forty or fifty dollars a month, always finds the occupation unremunerative when her expense for the care of her own child and

* See page 218.

the possibility that either her milk will give out or the foster child fail to digest it is taken into consideration. On this account, they say, many women prefer to go into service or take other steadier employment. May we not hope and believe that this scarcity has in it another factor, namely, that more mothers are refusing to give up their own babies? It is on this side of the question, as well as on that of having a source of supply for wet-nurses when the need arises, that the Boston project appeals. The fate of no individual has in it more of irony and pitifulness than that of the wet-nurse's baby. Born into an unwelcome world, and soon deserted by often its sole protector, only to be consigned to the care of a hireling, and how cared for every doctor knows, it almost always sickens and dies. It surely seems unfair that the rich baby should have all the chance. So the provision of the Boston plan, which insures the longest possible mother's care for the wet-nurse's child, and, after that, care in good surroundings under supervision, should accomplish much good and give these poor little ones the next best possible chance. The idea might well be taken up in many cities, with great advantage to all concerned.

THE CHANTEMESSE OPHTHALMOREACTION FOR TYPHOID FEVER.—Becker (*München. med. Woch.*, July 13, 1909) reports his experience with the ophthalmic reaction for typhoid fever. He first standardized his extract on rabbits and also by testing it in varying doses on patients who did not have typhoid. He found that the dose which would produce no reaction on his controls was 1-20 mg. At this dose the reaction was also negative in several patients who had had typhoid some years previously. An existing conjunctivitis was increased by the toxin. In 8 cases of typhoid convalescence of one to two weeks the reaction was positive. The only cases in which the reaction was negative were 2 of supposed typhoid in which bacilli were found in the blood, but were not definitely identified—possibly paratyphoid bacilli. Of 8 acute febrile typhoid cases the reaction was positive in 7, negative in 1. One case gave a positive reaction to both typhoid and paratyphoid extracts. The author cites the results of other observers who had not been able to get constant results with this reaction and states that their error probably consisted in the failure to standardize their toxin on healthy patients before beginning the experiments.—*Medical Record*.

MISCELLANEOUS.

PRESIDENTIAL ADDRESS BEFORE PHILADELPHIA PEDIATRIC SOCIETY.

January 11, 1910.

BY J. C. GITTINGS, M.D.

A study of the minutes of the Pediatric Society since its foundation in 1896 with its record of successful achievement has emphasized the distinction of being one of its presidents—a distinction of which I desire to express my sincere appreciation, the more as I feel myself to be unworthy of it.

This study of the minutes has also given me a new conception of the value of the Society as an educational factor in post-graduate medicine. During its thirteen years of existence cases have been shown and papers read which illustrated practically all of the uncommon diseases of infancy and childhood, to say nothing of the évery-day and less interesting affections.

The records have also shown that the Society has reached, or even passed over, what appears to be the crest of the wave formed by membership and attendance, and that it behooves us to indulge in some introspection lest the hollow which succeeds the wave smooth itself out into the complacent calm in which all headway will be lost.

While impressions often exceed analyses in value—and I am sure that most of you are under the impression that fears for the future are groundless—yet the figures shown by the records cannot be denied. The data on the membership of the Society, furnished by the treasurer, are available since 1903, when the members numbered 201. From this time the number increased each year, with two exceptions, to 218 in 1908. In the present year only 215 are enrolled. That an increase of only fourteen in seven years represents the Society's limitations can hardly be believed.

We have become accustomed, I fear, to rely too much upon the membership committee and to lose the sense of our personal obligation to the Society. It is owing largely to this committee that the membership has not decreased, since every year shows a considerable loss through resignations and other causes. It is

impossible for these three members as a committee to do more than devise various forms of general invitation from time to time. The factor of personal solicitation is the most important one, and if every member could become imbued with the proselyting spirit we would find that an average of at least 300 could probably be as easily maintained as the present one.

The membership, important as it is, concerns us less than the attendance, for the latter remains the true index of the vitality of a Society such as ours. An ultra-scientific body, whose sessions none but the most erudite attend, may produce among its handful of members some work of epoch-making value, but the clinical society must attract numbers in order to accomplish its first aim, which is to teach. The second aim surely is to furnish inspiration; to study the case, to read, to master the subject in point, to diagnose accurately, to treat intelligently and, last, which might well be first, to add something to the knowledge of the subject which has not been known before.

To return, however, to the analysis, which deals with the question of attendance.

The Society began its career in December, 1896. Allowing one year for proper organization, there are left for analysis twelve years which may profitably be divided into periods of four years each. Prior to 1906 the records show the attendance for members only. Subsequent to 1905, the guests also are enumerated.

During the first period ('98-'01) the average attendance of members at each meeting was thirty-two; during the second period ('02-'05), thirty; during the third period ('06-'09), twenty-eight. During the past year the average was twenty-seven.

During the four years of the third period the average number of guests was eighteen—fourteen—twenty-five and sixteen respectively.

This large proportion of guests during the past four years would seem to be due, without doubt, to the public invitation extended in the roster, since, in the few instances prior to 1906, when the number of guests was noted, it was comparatively small. A study of the records shows at once that certain meetings attracted a large attendance, notably those devoted to an address by some prominent man, usually a guest, or to a symposium on some important subject.

During the twelve years there have been ten addresses delivered and six symposia held, with an average attendance of fifty-

three members at the former and thirty-eight at the latter, while the average at ordinary meetings has been twenty-six.

Allowing for the factors of error—the inclemency of the weather, the confiction of counter-attractions, the greater or less prominence of the essayists—it yet seems clear that more were attracted by the individuals delivering addresses, who, with one exception, were strangers to Philadelphia, than by the symposia by several men more or less intimately known to the Society. The one notable exception occurred in the case of the symposium on rheumatism, and on that occasion one of the most important papers was contributed by a guest.

The reason for this difference lies not so much in a curiosity to see the celebrity or in the hospitable instinct, as in the desire to hear something new—something which will shed light on the dark places—something which no one present has ever heard or read of.

The records show a variety of presentations before the Society—cases in Vivo and cases in Kaiserling, case-histories unembellished and case-histories with a more or less complete résumé of the subject illustrated, exhibits of apparatus or of laboratory technique, and, finally, the results of research or of original thought.

The figures are interesting. During the twelve years there were 577 presentations exclusive of the special meetings; 48.5 per cent. of these were case exhibits, 41 per cent. were case histories or monographs, 5.8 per cent. were pathologic exhibits, and only 1.9 per cent. gave the results of original work. The remaining 2.6 per cent. comprised reports of Milk Commissions; exhibits of apparatus, etc.

In any consideration of means for increasing the growth and activity of the Society it is obvious that, attractive and stimulating as the special meetings have proved to be, their too frequent repetition would be unwise. The custom of having one of the nine yearly meetings partially or wholly devoted to an address by an out-of-town guest would seem to be proper. The symposium could claim another, but the remaining seven should undoubtedly be devoted to the use of members and guests from our own city for general pediatric purposes.

The latter have frequently contributed valuable and instructive numbers on our programmes, and it would seem that this source of supply—to give it a somewhat undignified name—might be

stimulated to our profit. Any member who has knowledge of valuable work being done by a non-member in some subject germane to pediatrics, should endeavor to secure its presentation before the Society. The earlier the notification to the secretary of a prospective paper, the more opportunity is afforded for the Executive Committee to provide for suitable discussion by especially invited guests. It may also be possible to secure another article on an allied subject by some one of whom the committee has personal knowledge.

The exhibition of cases deserves renewed attention. This has always been a prominent and important feature of our meetings. I would remind the members that it is not the example of the rare disease alone which is worthy of presentation. Those whose speciality is pediatrics are apt to forget that our membership contains many to whom examples of even the more common diseases are both interesting and instructive when presented with the few remarks which epitomize the latest knowledge on the subject.

It might also be noted that, although the presentation of a case does not necessarily entail a prolonged study of the literature, yet it does involve a thorough study of the case itself and therefore serves as a stimulus to careful clinical observation as well as to the employment of laboratory technique.

I would therefore urge the members not to neglect the opportunities which are so frequently being presented to them, but not sufficiently often to the Society.

We may next discuss the case-history, with its more or less thorough epitome of the disease illustrated.

I may preface my remarks on this subject with the earnest request that they will not be misinterpreted, or, in any sense, be considered as criticism. My object simply is to offer a suggestion both for our mutual benefit and, more important, for increasing the attractiveness of our meetings.

Most of you will agree that the case-history, as ordinarily presented, furnishes a dry—albeit a nourishing—mental pabulum for the audience.

The requirements for placing a case on record in literature are different from those which are necessary when the subject is to be treated verbally. Many articles, read before societies, lose much of their force and interest by their too close attention to unessential details. This would seem to be a survival of undergraduate and hospital days, when a set history of exhaustive thoroughness

is properly taught and insisted upon. What is proper for the records, as has been said, is by no means necessary for the article which is to be read. The latter can surely be written in a more pleasing style and legitimate abbreviations may profitably be made. It is remarkable how much may be omitted by confining one's self largely to the positive findings, leaving the negative ones to appear, often by inference, in the paragraph devoted to differential diagnosis, where they properly belong. Another economy of time can be effected by the omission of references and the avoidance of lists of authors' names.

The objection to these curtailments in the verbal article, as compared with the written, occurs at once; namely, that it would necessitate the preparation of two complete articles.

In reply to the objection I would recall an address by W. W. Keen on the subject of the presentation of papers before societies, in which he makes the incontrovertible claim that the article which is read loses half of its force. He strongly urges the practice of the art of speaking without notes, whereby the audience receives to the full the sense of what is said, mainly because it is addressed to it, not read at it.

Few there be who are able, even with patient practice, to profit by this advice, but if practice is ever to be successful, the most promising beginning will be made by preparing a careful résumé of the completed article, and from the familiarity with the subject which this brings, many of us, I am sure, could learn to talk at least half the article with our eyes on the audience instead of on our notes.

I am tempted to give this somewhat audacious advice for several reasons. First, because of my own sincere desire to follow it. Secondly, because the main reason advanced by many of our professional brethren for not attending meetings is that they can read all of the proceedings more profitably in original articles or reprints, and lastly, because the same and other brethren have insisted that the boredom engendered by listening to the reading of case-histories is not to be endured. Since I have done my share in causing such weariness and realize how much more effective my presentations might have been made, I venture this plain statement.

It would surely redound to the credit of our Society if it could produce in the course of a few years a number of men who could deliver, not read, their addresses—and it might be said that in no

society is there better opportunity for practice in this art than in ours, where a friendly spirit pervades the atmosphere, and where kindness, not acrimony, tinges our debates.

As with the case-history, so, although to a lesser extent, with the monograph. If the author could find time after the article had been written to prepare a full abstract or, perhaps, only a slight condensation of the subject, which would enable him, in part at least, to deliver the article, the result would well repay the effort.

What the card specimen is to our sister Society of Pathology, the case presentation is to ours, and yet we enjoy the advantage of both. For the purpose of illustrating the case-history or article, the specimen ranks second only to the case. Unfortunately the former often becomes the only possible exhibit. It would be well for those members who also owe allegiance to pathology, to remember that an exhibition of the pathology of childhood will be more appreciated and serve a more useful purpose before the Pediatric Society than at a meeting where a majority of the audience is clinically interested in adults. In the case of a rare specimen, the exhibit properly could be made before both gatherings rather than at the Pathological Society alone. In connection with the exhibit itself it is well to note the fact that a complete pathological demonstration should include not only the gross and microscopic appearances of the organs, but, whenever possible, the correlation of these findings with the resulting loss or change in function, especially in regard to the symptoms during life—the pathological physiology. The latter, to clinicians, is of paramount importance.

Of demonstrations of laboratory and clinical technique before the Society much could be said.

One of the most interesting numbers during 1908 was the exhibition of the method and effects of using tuberculin for diagnosis. Another of importance was the demonstration of the method for determining the various forms of fat in the stools of infants. Many other possibilities suggest themselves which could not fail to be of real value to a majority of us. They serve the double purpose of supplying some deficiency in our armamentarium and of furnishing the necessary stimulus to accuracy in diagnosis—a goal toward which we strive, but from which the enervating effects of a busy life often tend to lead us.

We have thus considered some of the means for increasing the attractiveness of our meetings along the lines which custom has prescribed.

If our Society is to be a real factor in shaping the course of pediatric medicine, however, and if it is not to be content merely to give the finishing touch to medical education, it must contrive to enter much more often than in the past the field of investigation—the surface of which has been so lightly tilled, and from which such abundant harvests surely can and will be gathered. The harvesters in this field will be the younger men and, as in any new movement, so the need in this is to stimulate their interest that they may be induced to undertake the work.

Therefore, let us wander down the path which leads to the secluded spot where research emerges through long hours of labor to the light of accomplishment. To carry the simile further, some of the work is still-born; more lives its short and fitful life only to succumb to the cold criticism of a relentless yet practical world; still more survives to live a life of usefulness; not vigorous or original enough for independent existence, but, shoulder to shoulder with other facts, born of the same labor, helps to build up an edifice within which will rest one of the essential truths of medical science. Rarely, all too rarely, there is born some lusty truth which, after a few years spent in overcoming the prejudices against its youth, assumes a place upon the altar of our edifice at which we gladly worship.

Research.—"Le dernier cri," of medicine, which, some fear, will lead so far astray that clinical acumen will be numbered among the lost.

For a certain few, the fervor of investigation may pervade their beings to such an extent that they become, indeed, lost to clinical medicine.

That this first apparent loss becomes a later gain is well exemplified by the career of one whom the investigating spirit has stimulated to such wonderful results at the Rockefeller Institute. The calamity would be for such as he to be lost to research!

For one such man there are hundreds who, from necessity or choice, never venture far from the clinical field. The custom in the past has been for the graduate, as he leaves the college or the hospital, to devote all of his time to clinical work. That he thereby more quickly becomes a competent practitioner earning a competency or better, I cannot but believe—but I do not believe that the choice, if choice exists, is the wisest or most far-seeing one.

With the many unsolved problems confronting us and the many and constantly increasing methods being devised for their

solution, no recent graduate who has the personal equipment and the opportunity, should fail to devote at least a part of his time to research, whether this be clinical or scientific; whether it be through the channels of the ward or of the laboratory. If he fails to interest himself in such work during the first five years of his graduate life the chances are that he will lose all adaptability or opportunity for it.

Looking at the matter from the utilitarian standpoint the advantage of such a course may not be at once apparent. The end results, however, are usually far in excess of what can be gained by clinical plodding along the beaten path. The proof appears in the answer to the question: Which counts the more in the young physician's favor—the clinical article on some unusual disease on which he has expended a vast amount of time and labor in gathering together the known facts—or the publication of the results of some investigation on that disease which throws new light upon its etiology, or treatment, or upon some of its characteristics; results which never have appeared and, perhaps, never will appear except in conjunction with their author's name? If such work is succeeded or accompanied by clinical work, how quickly its originator springs into prominence.

Do not misconstrue my meaning to the belief that practise in the clinical art is unnecessary or that the carefully compiled monograph serves no useful purpose.

No one whose aim is medical practice could succeed without thorough and prolonged training in the observation of disease. The complete monograph from time to time serves as the judge, under whose guidance order is brought out of the literary chaos, the true and the half true or false are sifted and the picture of the disease is presented, renovated and reframed, to serve as teacher until the discovery of new facts again renders it obsolete.

To pass from the utilitarian to the ideal, we may note that the training afforded by following the technique which is involved in any investigation is invaluable. In no other way can accuracy and thoroughness both in method and observation be more quickly attained. The carefully conducted experiment develops the powers of logical deduction and, if properly superintended, is fatal to the habit, too easily acquired, of forming hasty and unjustified conclusions.

As a trainer of mind and of eye—of observation and percep-

tion, of accuracy and of judgment—there is no more fitting prelude to the study of disease itself than research.

It seems probable that some are deterred from attempting it by reason of their supposed lack of equipment as well as by their ignorance of how to make a beginning.

If a man has found real interest in the theoretical side of his medical studies; if he has not been content to learn the known facts of disease without query as to the unknown; if he possess an average ability, and if he is not afraid of work, he is capable of learning the details of some line of research and will, as a rule, find an interest in it which nothing else supplies. The men under whom he has recently received instruction will, only too willingly, suggest, if suggestion be asked, some subject upon which a beginning can be made. With the unfolding of the work will come ideas which no amount of meditation at the onset can supply, and he will quickly learn his adaptability and limitations. Only a few possess the originality which conceives the outline of the work and the ingenuity which overcomes the difficulties encountered in attempting to solve the larger problems. Much that is of real value, however, can be accomplished along less ambitious lines, both clinical and scientific—and the task of proving or disproving the work of others is, in its way, as necessary as the original itself.

And now that I have finished I find myself wondering whether you will think that I have been given too much to unasked advice and too little to accustomed praise.

Of the latter one can only say that praise belongs more to the earlier years which brought the Society to such a high plane of efficiency that Dr. Rotch not long since alluded to us as the most vigorous pediatric gathering in the United States. It is to the older men whose names appeared so often upon its minutes—many of whom still form the keystone of our structure, many more of whom unfortunately, we rarely see—that the Society owes its largest debt of gratitude.

As to the advice, it was conceived, you may believe me, in the earnest desire that the Society should continue to go forward—in the fear that its failure to increase during the past year was due, in some measure, to my own neglect. As the retrospect always furnishes the clearest vision, so my sins of omission seem to cast their reproachful shadow upon me.

If I have exceeded the bounds of your toleration I beg your forgiveness for the sake of the Society, which we cherish and whose interests should be our own.

SOCIETY REPORTS.

THE NEW ENGLAND PEDIATRIC SOCIETY.

Meeting held January 29, 1910.

DR. CHARLES P. PUTNAM, CHAIRMAN.

DR. DAVID N. BLAKELEY reported a case of

ALCOHOLIC CIRRHOSIS IN A BOY OF FOUR YEARS,

in which there was a history of alcohol but unfortunately no autopsy.

DR. DUNN.—I once saw at autopsy a somewhat similar case in which the liver showed the ordinary atrophic condition which corresponded to the hobnail liver seen in adults. The etiology was traced to the child's going into its mother's room and drinking from her cologne bottle. It seemed a rather interesting case and the facts of the cologne drinking were vouched for by the older children who witnessed it. The liver was very small in that case. There was no history of its ever having been through the large stage at all.

DR. JOHN LOVETT MORSE presented some cases illustrative of

JAUNDICE IN THE NEWBORN

and commented as follows:

Jaundice in the newborn, although in the vast majority of cases merely a manifestation of the condition known as icterus neonatorum, may be due to a variety of causes, some of them very serious. Knöpfelmacher's explanation of the origin of icterus neonatorum is the most satisfactory. No treatment is indicated. Septic infection of the newborn is far more common than is generally believed. Jaundice is not an uncommon symptom. No justification for setting apart the cases with jaundice and cyanosis under special names, such as Winckel's or Buhl's disease. Diagnosis from icterus neonatorum made principally on general condition, temperature and presence of bile in the urine. Jaundice from congenital obstruction and obliteration of the bile ducts is also rather more common than is usually supposed. In this condition the stools are white or gray at birth or as soon as the meconium has been passed, and do not contain bile. The urine

does contain bile. "Catarrhal" jaundice is very unusual at this age, but sometimes occurs. Diagnosis from congenital obliteration of the bile ducts is often hard but can be made on the absence of enlargement of the liver and spleen. Jaundice sometimes occurs in connection with a syphilitic interstitial hepatitis. In this condition the liver and spleen are both much enlarged, and other evidences of syphilis are almost invariably present. The so-called congenital icterus, in which babies are born jaundiced and remain jaundiced throughout life, the jaundice and its cause having little or no effect on the general condition or the expectancy of life, is very uncommon, only 14 cases having been reported. The etiology is very obscure. Diagnosis cannot be made in the first few weeks. Jaundice also occasionally occurs in the newborn, which cannot be explained by any of the conditions mentioned, and which in some cases is not satisfactorily explained even after the postmortem examination.

DR. TALBOT.—The influence of bile on the digestion of fat is rather interesting in this connection. Bile is necessary for the activation of the pancreatic splitting ferment. When it is absent, fat appears in the feces in the form of neutral fat. The examination of the stools, therefore, gives very important information as to the functioning of the bile. In one of these cases, Homer T., the majority of the fat was split into fatty acid and soaps. This meant that the digestion of fat was being carried on normally. The subsequent history of this case was favorable. In one of the other cases, Robert M., the majority of the fat was unsplit. This indicated a more serious disturbance in the digestion of fats, and the fatal termination substantiated this assumption. Reuss (*Jahr. für Kinderhk.*, Vol. XVIII., 1908, p. 729) describes a case of congenital obliteration of the bile ducts with autopsy, in which there was a little bile which came through the papilla of Vater into the duodenum. There was partial obstruction to bile and no obstruction to the pancreatic juice. The stools were all in the form of neutral fat. In this instance the fat was not digested because the bile did not come through in sufficient quantity to activate the fat splitting ferments and not because trypsin was absent.

DR. RHEA.—I will speak first of the case with congenital obliteration of the bile ducts for the reason that it possibly might throw some light upon the cause of the obliteration in at least some of these cases. In this particular case there was very

marked inflammation in the bile passage and inflammatory changes that certainly had extended over quite a long time, because there was marked change in the epithelial cells that lined the bile passages, and the common bile duct. On sections from the anatomic situation we could not find any trace of the bile duct at all. The gall bladder was represented by a very small cavity, and the obliteration became complete just about at the anatomic situation. There was evidence of thrombus in the gall passages which caused the accumulation of bile in them. This inflammation was certainly of enough age to be perfectly in keeping with the condition in the liver itself. You can easily imagine that the inflammatory process was possibly primary in the gall passages and from there passed up into the liver and lead to the jaundice, these being followed by the cirrhotic condition. The common bile duct was absolutely occluded. The papilla of Vater showed no opening at all. That might be explained by some influence that the pancreas had upon the papilla of Vater.

The other case which Dr. Morse has reported, that of the jaundice without any obliteration of the gall passages and without any cirrhosis, simply presents a picture of obstructive jaundice. There was bile in the common bile duct, because when you pressed upon it bile passed into the intestinal tract, and the obstruction most probably was within the lobule of the liver, that is, the finer branches of the bile passages, which became occluded possibly by some very mild inflammatory process. This type of jaundice is a great deal more difficult to explain than the ones you get with obliteration of the gall passage. In accounting for the obstruction when the ducts are not obliterated, I think most probably that the changes are really inflammatory in nature, they are not in the common bile duct, they are in the very smallest branches that go down between the liver walls and in between the lobules of the liver, and it takes very little inflammation to lead to their occlusion entirely.

DR. RICHARD M. SMITH read a paper on

SCARLET FEVER PROPHYLAXIS WITH STREPTOCOCCUS VACCINE.

(See page 201.)

Dr. Smith added, in reply to an inquiry of Dr. Chase as to where one can obtain the vaccine, that Dr. Mark Richardson, of the State Board of Health, was the man who suggested this work to him. Dr. Smith was able to collect the material from the

original works in Russian, the translation having been made by a Russian physician. He had some of the vaccine which was made from cultures taken from scarlet fever throats, and he would like, if an epidemic of scarlet fever started in some school or asylum, to have an opportunity to vaccinate part of the children, in order to compare percentages of infection in vaccinated and unvaccinated.

DR. PILLSBURY.—I would like to ask about the epidemic of 1856. My recollection of scarlet fever in 1856 is that it was fatal. At present we have epidemics all through the state, but the cases are very mild. The same thing has happened in Newburyport, where in one neighborhood there was a large number of cases and the authorities closed the school. In that section there were no deaths and the children were on the street desquamating, and if they were not killed by drugs they recovered with absolutely no danger. I have had scarlet fever cases where all that was done was to isolate the child and give symptomatic treatment. This was in country districts. The child was isolated, with a good, sensible mother to take care of it, and with the exception of 5 or 6 cases I never saw an epidemic in which they contracted the disease. It seems to me that we do not get the epidemics that we did years ago.

DR. CHASE.—We have only a comparatively small number of scarlet fever patients at the Brookline Board of Health Hospital each year. We had something like 30 cases of scarlet fever there sent from Boston the year before last, and also the previous year, the overflow from the South Department, and we safely sent them home again to Boston and none of them went to their "long home." We had one death last year among our 31 cases of scarlet fever at the hospital; that was an adult suffering also from chronic alcoholism.

DR. CRONIN.—I understood the reader to say that this vaccine was harmless, except in one instance. I would like to ask if Dr. Smith thinks that in an institution like the South Department, where now and then scarlet fever breaks out in the diphtheria or measles wards, it would be safe to vaccinate children on entrance; that is to say, would it make any difference about giving the vaccine if the child had diphtheria or measles.

DR. SMITH.—A great many of the statistics have been left out of cases in which the vaccine was given. When given to the

patients ill with typhoid, pneumonia, and other infectious diseases, no bad results followed; there was a local reaction and slight rise in temperature, but nothing else. There are a very few cases where albumin appeared in the urine immediately following it, but soon disappeared, causing no permanent harm.

DR. STANTON.—I would like to inquire if any of the cases which developed from rash, strawberry tongue and sore throat, following inoculation with the streptococcus, were a source of contagion.

DR. SMITH.—I do not remember any record in regard to it. As far as I know there was no record of that. It is an interesting fact that all the cases that had the scarlet fever vaccine and later contracted the disease were mild cases, even though the epidemic in which they occurred was a severe one.

DR. LUCAS.—The severity of different epidemics, I think, can be explained by the fact that in any locality where epidemics have run with great severity, the next year they are less severe, *i.e.*, with a decrease in mortality, or vice versa—if they start with a small mortality the later epidemic may be a great deal more severe. Usually the disease starts in with great severity in the first epidemics, but later on the epidemics become very much less severe.

One of the most interesting points about the use of this vaccine is this new way of determining the etiology of this condition. The experimental work that has been done along this line is the kind of work we are coming to in a great many of the infectious diseases, where it is very hard to find out the etiology, and through work like this is the best way of finding out the value of these vaccines. The statistics that were given are remarkable from the fact that most of the severe complications that we get and that we know of in scarlet fever are caused by streptococci, and for that reason, whether it does check the scarlet fever or not, it may have some value in these severe complications.

DR. PUTNAM.—Dr. Lucas' suggestion seems quite reasonable that the vaccine in these cases may relieve the complicating streptococcus disease and may, thereby, while not affecting the scarlet fever, make it comparatively harmless. I have used the staphylococcus and streptococcus vaccines in cases which were probably due originally to the grip bacillus and the patients have appeared to be greatly benefited thereby. This appears to be quite analogous.

DIRECTORY FOR WET-NURSES.

DR. TALBOT.—In brief, the matter which I have to present to you is as follows: that is, to have a place where wet-nurses can go and wait for positions and where the public can go and obtain a wet-nurse any time they need one. A public-spirited gentleman has promised enough money to run the establishment for about two years, at the end of which time the directory will be a necessity or a failure. The directory is to be run under the auspices of the Hospital of the Massachusetts Infants' Asylum, which will charge a nominal fee of \$10 when supplying the wet-nurses. It is not a money-making proposition. The wet-nurses will have had a thorough physical examination, their babies will be under observation and records of their weights kept, obtaining in this way as much information as possible concerning the quality of the breast milk. The mothers will be taught to be cleanly and how to take care of babies.

Another point which does not interest you, but is a very important part of the work, we hope, is that opportunity will be given these girls to keep their babies with them long enough to become attached to their children, so that they will look after them in their future life. At present, they have to put their babies to board when they go to work; the mother then loses her love for the child and wants to get rid of the incubus as soon as possible. We hope that the mothers will have an opportunity to stay with their babies, get fond of them, and take some responsibility toward their future, thus saving the state the expense of rearing more orphans. There being no room in the Hospital of the Massachusetts Infants' Asylum for this new line of work, a house in the near neighborhood has been taken for the purpose and is under the supervision of a matron, who is to have charge of the training of the mothers. The directory will be grateful to any one who can send wet-nurses to it or who will use it as a means of obtaining them. The fee need not be an obstacle, as we will have a sliding scale; however, if anyone can afford to give more they will be helping a good cause along. If anyone wishes to know more about our directory, I will be glad to supply them with more detailed information. Information can also be obtained any time by telephoning the Hospital of the Massachusetts Infants' Asylum, Jamaica, 132.*

* Since this notice was given to the members of the New England Pediatric Society, the Directory for Wet-Nurses has started. It is now, February 1st, prepared to receive and supply wet-nurses.

THE NEW YORK ACADEMY OF MEDICINE.—SECTION
ON PEDIATRICS.

Stated Meeting, held February 10, 1910.

DR. ELI LONG, CHAIRMAN.

DR. EDWARD W. PETERSON presented two patients. One a boy who had recovered from an operation for intussusception occurring when he was five months old; and the other a child of three who two years ago had undergone a laparotomy for tuberculous peritonitis and now seemed in perfect health.

INTUSSUSCEPTION.

DR. JOHN F. ERDMANN read this paper. As the surgical technique of this class of cases was not the essential feature for this Section on Pediatrics, he said he would but emphasize the operative necessity, and call attention to the symptoms, differential diagnosis, etc. In his series of operations, now about forty-five, he had been struck by the health of the patients, few having been ill in any way before the onset of the trouble. There was the sudden onset with colicky pain, accompanied with shock; this primary onset was then followed by cramp-like pains, intermittent in character. During the periods of cramp the child cried and was restless; while in the intermission during the first twelve or twenty-four hours, one was surprised at the temerity of the diagnostician who was rash enough to suggest an abdominal section. The early shock disappeared as the first hour passed. The diapers were very likely to be slimy and contain an admixture of blood. This evidence of blood was pathognomonic when there was a previous colic, shock and spasm picture. The blood evidences might be slight and with large quantities of mucus, or the reverse might obtain. Frequent desire to defecate, tenesmus with little result except small quantities of mucus and blood, vomiting and distension of the abdomen were later developed in the order mentioned. Palpation, even under an anesthetic, was not followed in the majority of the cases by the finding of a tumor, and certainly not the classical sausage-shaped ones described in the text-books; one was more likely to find no tumor from the fact that very often the tumor was hidden behind the costal arch of either side. Rectal examination revealed a tumor far less often than abdominal palpation, unless the case be one of a day or more duration; but, as a rule, withdrawal of the examining finger was followed by blood and mucus. The abdomen was lax in the early hours, but subse-

quently became distended. The pulse was accelerated. The temperature was usually subnormal or normal at the onset, but a moderate rise ensued with the progress of the disease. The differential diagnosis of these cases was sometimes extremely difficult, especially in those cases with visceral crises in the erythema group of skin diseases. Little or no difficulty should be met with in making the differential diagnosis in a case of appendicitis; in these cases the pain was a general one with a localization, with temperature and pulse higher than in intussusception.

In considering the treatment he inserted, with a few alterations, a portion of a paper published in the *New York Medical Journal* in May, 1904.

"Rectal enemas in the first few hours are not productive of harm, but may, though rarely, be followed by reduction.

"Admitted that one meets occasionally with reduction by the use of enemas, nevertheless, this very important fact must be remembered, *i.e.*, that the whole mass may be reduced except the ileocecal junction and one or more inches of the ileum. This being so, all the symptoms clear up for a time. They again return and necessitate operative interference at a time when the conditions of this region are not nearly so favorable to reduction, and may even require excision. This condition was well demonstrated in my sixteenth case, a male child, seven and a half months old. Duration eight and three-quarter hours. Injection used by the father, a leading physician of this city, Dr. H. M. Silver and myself, was followed by a perfectly tranquil picture; but, realizing the possibility of this condition of incomplete reduction, we all felt that the risk of exploration would be far less than that taken by leaving matters rest for further manifestations. That our fears were not groundless was proved by the evidence of a mass at the cecum, which consisted of almost three inches of the ileum and the entire appendix. Reduction was readily accomplished, the appendix was removed, and recovery followed. I should, therefore, not feel satisfied that reduction had taken place, even if the child should have no further manifestations of pain, etc., unless this was followed in a short time by a movement of the bowels that we could feel satisfied had come from beyond the supposed site of the intussusception; and that in the waiting interval for a movement we should be prepared to proceed at a moment's notice with the operative measure. The use of enemas previous to operation was offered as a suggestion, but I can say clinically that it is of

very valuable service, as there is no doubt that the injections reduce a portion of the intussusception, and any agency or procedure that limits operative time must of necessity diminish shock in direct proportion. Although these little patients bear operative interference quite well, it is quite significant that my greatest mortality rate occurred in those cases which required the longest time for reduction, and that these cases were also the ones of longest duration. Enemas as a means of reduction are not advised after six hours' time has elapsed from the first positive symptoms, as, after this period, much valuable time is lost by such procedure."

In Dr. Erdmann's last 16 cases of operative reduction the average age was six and a half months, the youngest being sixteen weeks old, with males in excess. One of these 16 died, the cause, in all probability, being status lymphaticus. All his excision cases in children succumbed.

In conclusion, Dr. Erdmann said that early recognition of this condition was absolutely necessary to a high recovery rate. Inflation was decidedly not useful, but dangerous. Enemas were successful in an exceedingly small proportion of the cases, and should not be used after six hours. The earlier the operation, the more likelihood of a small mortality. Late operation predicated the possibility of gangrene, with all its horrors.

APPENDICITIS IN INFANTS AND CHILDREN.

DR. CHARLES N. DOWD said that appendicitis in children offered many peculiarities. He could not consider all, but wished to refer to a few points which hinged about two questions—(1) when to operate and (2) how to operate. It was easy to say operate at once, but this depended upon the diagnosis, and the diagnosis of appendicitis in children was very difficult. In adults the diagnosis usually could be made promptly and a successful result obtained; whereas, in children, there occurred repeated consultations with delay and often a general spreading peritonitis, with a fatal result. Murphy, of Chicago, had called attention to four important symptoms in acute appendicitis which followed as a sequence; if they did not follow as a sequence the diagnosis of appendicitis might be questioned. First, pain in the abdomen, sudden and severe. Second, nausea or vomiting, usually three or four hours later. Third, abdominal sensitiveness, most marked in the appendicular region. Fourth, moderate elevation of temperature from two to twenty-four hours after the onset of the pain. The first, second and fourth symptoms were of little significance

in children, except as confirmatory of the third. Therefore, one was easily misled in making a diagnosis of appendicitis in children. One must depend mainly upon the third symptom in making such a diagnosis. Muscular rigidity, which indicates this tenderness, is as definite in children as it is in adults. It is not, however, so definitely localized, since children's appendices are relatively longer than adults, and the rigidity will vary with the position of the appendix. It will be in the hypochondriac region if the appendix lies upward; it seems like general abdominal rigidity if the appendix lies toward the median line. The rigidity is less marked if the appendix lies in the pelvis, since the bony parts protect it from traumatism, but one is helped here by the occurrence of bladder irritability. This one symptom of vesical irritability is, in many cases, a very valuable guide in determining the diagnosis. It is easy to see that if only the ordinary symptoms of appendicitis are considered we have a much more difficult problem in children than in adults. There are several distinct inflammations which are apt to make a differential diagnosis difficult. Amongst these are the following:—

(1) Beginning pneumonia. Occasionally adults with a commencing pneumonia will give symptoms very suggestive of an appendicitis, but in children this occurs frequently. Such a diagnosis is frequently made in children who are sent into St. Mary's Hospital with beginning pneumonia, but soon the rapid respiration, the peculiar appearance of a child ill with some thoracic disease, and the absence of other classical signs, point to the real trouble in the lungs, and operation is avoided. But those cases were very misleading.

(2) General peritonitis from unknown causes. Children were very apt to have a spreading peritonitis from an unknown site of infection. (Holt and Kerley have described it. The writer has recently published an article on the subject in the *Annals of Surgery*). The condition causes a very rapidly spreading peritonitis, usually with a fatal termination. This is found more often in children than in adults, and it constitutes one of the traps which await the diagnostician.

(3) Tuberculous peritonitis is common in children and often simulates appendicitis; it is usually the form with a plastic exudate, and not the ascitic form, as found in adults.

(4) Pneumococcus peritonitis.

(5) Gonococcus peritonitis.

(6) Cyclic vomiting often gives symptoms very much like those of appendicitis. It is interesting to note that Comby, of France, has operated upon many cases believing the condition due to a chronic form of appendicitis, and a large proportion of his cases have been cured by the operation.

(7) Foreign bodies. Dr. Dowd said that he had taken three pins, for instance, from the appendix. In one instance he found a round worm free in the peritoneal cavity, with no indication of its point of exit from the intestine.

(8) Hip disease.

In looking over this list it would be shown that the diagnosis of appendicitis in children presented more difficulties than it did in adults, especially when one remembered the lack of history in the case of the infants. But really the diagnosis of appendicitis in children was not so difficult as the long list indicated.

When the diagnosis of appendicitis had been made the question then arose when to operate. Whatever opinion one might have in regard to this question in adults, when dealing with children all ideas of delay should be thrown aside; so soon as the diagnosis was made, operate. Children were more apt to have a spreading peritonitis with appendicitis than were adults. Ochsner said there were two classes of people who, from the thinness of the omentum, are apt not to have their appendical inflammations shut in—(1) old, emaciated adults, (2) young children.

Dr. McCosh once read a paper in which he advanced the same idea as did Dr. Ochsner. Operate as soon as the diagnosis is made. This should be placed down as a general rule in dealing with appendicitis in children.

With regard to the mortality, it was once very high. Rotter reported having lost 66 per cent. of 6 cases under five years; Israel lost 47 per cent. of 15 cases; Broca lost 44 per cent. of 59 cases; Kerewski lost 41 per cent. of 17 cases; Senander lost 25 per cent. of 4 cases, and Sonnenberg lost 15 per cent. of 26 cases. Last year George Alsberg reported 16 cases occurring in children without mortality. The following was Dr. Dowd's own table:—

TIME OF OPERATION AND MORTALITY RATE.

	Number of Cases.	Early Date.	Later.	Interval.	Mortality Rate.
Group 1	70	15.7	57.1	27.1	10.
Group 2	50	16.0	74.0	10.0	8.
Group 3	61	36.1	49.2	14.7	0.

Murphy, of Chicago, made this statement: "A man who is having more than three or four deaths in a hundred operations for appendicitis is either receiving his patronage from incompetent and procrastinating medical men, or is doing too much manipulating in the peritoneal cavity under unfavorable pathologic conditions." This statement brings in the two essentials of success in appendix work. The second, simplicity of operation, is as important as the first, promptness in operation, and it is remarkable to note how generally a simple technique has been adopted, removing the appendix when practical. Draining the local abscess and leaving the rest of the peritoneal cavity to care for itself, and even the removal of the appendix, should not be done at the primary operation if too extensive treating of adhesions are necessary in order to accomplish it.

With regard to the age, a child under two years would not stand as good a chance as one over two years; yet these young children would do well if one was able to make an early diagnosis and did not attempt to do too much at the operation.

Children had a great capacity for getting well if they were given a chance. It was the difficulty of diagnosis rather than the question of operation which made the mortality rate so high for little children. They stood the simplest operations wonderfully well.

DR. EDWARD W. PETERSON, discussing Dr. Erdman's paper, said that he believed that there was no type of intestinal obstruction so easy to diagnose as intussusception. Acute invagination generally manifests itself in a subject whose previous health has been good. The onset is sudden, with severe paroxysmal, colicky pains, vomiting and straining and muco-hemorrhagic stools. Constant desire to go to stool, with the passage of mucus and blood, without feces or flatus, is pathognomonic of intussusception. If, in connection with the symptoms just mentioned, a cylindric or rounded intestinal tumor can be felt, then the diagnosis is rendered reasonably certain. It might be added that in cases of intussusception a careful examination of the abdomen and rectum—under an anesthetic if necessary—will generally reveal the presence of a tumor. He had operated upon 9 cases and had seen as many more, and in every case a tumor could be felt.

In intussusception the prognosis is going to depend not so

much upon the duration of the affection as upon the amount of obstruction and the degree of strangulation to the blood supply of the invaginated gut. He agreed heartily with the recommendations for treatment as outlined by Dr. Erdmann.

In discussing Dr. Dowd's remark, he said there was no question about the difficulty of making a diagnosis of appendicitis in infants and young children. He was surprised at the mortality of 30 per cent. given by a certain Brooklyn surgeon in discussing the subject. In his own service in children's wards of the Post-Graduate Hospital he had lost but 1 case during the past seven years. Children stand the operation remarkably well, if one is careful not to attempt too much.

DR. GODFREY R. PISEK, discussing Dr. Dowd's paper, said that rectal examination had not been referred to, a method of great help in diagnosing appendicitis in infants and children. Children stood this well and the finger could readily be passed into the rectum, and a tender or enlarged appendix or an abscess could be palpated and located, especially if the bimanual method is used.

With regard to cyclic vomiting he recalled the case of a child of a physician who had this symptom-complex and who was operated upon for a subacute appendicitis. Since this operation she had become much improved and under the same treatment as before the operation.

DR. SARA WELT-KAKELS said that she had been impressed with the fact that sometimes in these cases of intussusception there were not always evidences of pain, mucohemorrhagic stools and tumor in the abdomen, and she believed the general practitioner, in treating cases of gastroenteritis, should think of the possibility of intussusception, even in the absence of some of the well-known cardinal symptoms.

The doctor remembered one case which occurred in her experience over a year ago in the Mt. Sinai Dispensary. A child was being treated for gastroenteritis; the mother did not think the child was improving and asked for admission to one of the best hospitals in the city, but was refused. She then brought the child to Mt. Sinai Dispensary, and one of Dr. Welt-Kakel's junior physicians asked her to examine the child. This she did, and by rectal examination a diagnosis of intussusception was readily made. Within an hour and a half the child was on the operating

table. A loop of gangrenous intestine was found, a resection was performed, but the child died twenty-four hours later.

DR. WILLIAM P. NORTHRUP said that he always taught his students that there were three things which they would meet more often from the time of graduation until they quit their calling, namely: the diarrheal diseases of summer, the corresponding illness of winter, pneumonia, and intestinal obstruction.

In speaking of intussusception Dr. Northrup reported 2 cases which were cured by rectal injections.

Among the causes of intestinal obstruction, fecal impaction had not been referred to, and Dr. Northrup related an interesting case. This child was a robust youngster, with an inordinate appetite, swallowing great quantities of food. Once he indulged in almonds and meat. Soon he began to have pain, obvious peristalsis, and vomited persistently. For three weeks he went on in this way. Dose after dose of castor oil was given and each dose was followed by a watery discharge. Finally a practitioner said, "Give him rhubarb and soda; if without effect, give it again and again." This was done, and one day this child passed a large, rotten, putrid bolus which contained, among other things, almonds. The baby had been well since.

He recalled an instance seen for Dr. McCosh. The child had a little fever and had had some vomiting. There was tenderness in the right flank. When the bladder was empty the patient complained of pain, but when the bladder was full no pain was complained of. There was nothing to be found along the genito-urinary tract. There was a great deal of pain. The diagnosis, however, was not difficult to make. The appendix was in an abnormal position, for some reason becoming wrapped around that viscus and there was found an abscess. The filled bladder caused no pain; but when the bladder was emptied, the dragging produced caused the pain. The diagnosis was made of an appendicitis with the appendix behind the bladder.

DR. CHARLES N. DOWD closed the discussion. With regard to the leukocyte count, this was in his experience a very indefinite guide, for there were so many variations that it was hard to be guided by it. He said he had operated upon abscesses where there was a 36 per cent. polymorphonuclear count; in several cases where there was a low differential count, and occasionally there was a low leukocyte count, while in very many cases there was a high leukocyte count which had no discoverable lesion. One had better

forget what was said about the leukocyte count and be guided by other things. Probably in the majority of the cases the leukocyte count would correspond with the condition found; but there were so many exceptions that he could not interpret and he did not know anybody who could.

The presence of calculi was another one of the traps in diagnosis and which might very easily mislead one. He said he had never seen a ureteral calculus occurring in a child, although since calculi occurred in the bladder he supposed they also occurred in the ureter.

Rectal examinations he had never found as valuable as the abdominal examinations, although he regularly made them. The abdominal muscles were a tell-tale, and he could find no structure by rectal examination which gave an equal amount of information.

THE MENINGES IN SCARLET FEVER. (R. Benard, in *Berlin. Klin. Woch.*, May, 1909.) Unfortunately, many of the cases of meningitis complicating scarlet fever which have been reported in the past are without foundation. The introduction of the lumbar puncture in 1900 has made diagnosis possible during life. Benard shows its rarity by finding only 9 cases in 13,550 cases of scarlet fever in hospitals from all parts of the world. He has concluded from his 28 authentic cases, proved either by lumbar puncture or autopsy or both, that it is very rare, is found practically only in infants, secondary as a rule, and most often resulting from an otitis media, due to the patency of the Petrosquamosal suture. The most common organism is, as would be expected, the streptococcus. He makes the following divisions of its pathologic anatomy: Infection meningitis, bacteria being present without cellular reaction; secondly, reaction meningitis, manifested by simple cerebrospinal hypertension, lymphocytic spinal meningitis and meningeal congestion; and lastly, true meningitis, which may be merely histologic, seropurulent or purulent. The symptoms are typical of meningeal irritation or meningitis, according to the severity of the invasion. The same may be said of the progress and the prognosis. Some of the cases of reaction meningitis recover, according to the virulence of the organism. But on the whole the outlook is very grave. Hence the treatment is of little use. Repeated tapping may give relief, especially in cases of hypertension. But, as a rule, the progress is sure and rapid to a fatal termination.—*Boston Medical and Surgical Journal*.

THE PHILADELPHIA PEDIATRIC SOCIETY.

Stated Meeting, February 8, 1910.

CHARLES A. FIFE, M.D., PRESIDENT.

THE CUTANEOUS DIAGNOSIS OF TUBERCULOSIS.

DR. CLEMENS FREIHERR VON PIRQUET, of Johns Hopkins University, Baltimore, delivered this address by invitation. (See page 161.)

DR. JOHN HOWLAND, of New York, who discussed the paper by invitation, said: "As the result of Dr. von Pirquet's observations, controlled by autopsies and confirmed by numerous workers in all countries, we may assume that the cutaneous test is of the greatest sensitiveness and accuracy. It is true that occasionally it fails in the last stages of tuberculosis and in measles, but in the former of these conditions any treatment is valueless and only the satisfaction of an accurate diagnosis is affected; and, as far as the latter is concerned, one would hardly apply the test during an acute attack of measles. In addition to its sensitiveness and accuracy, the test is the easiest of all biological tests to apply, meets with no opposition and is almost always readily interpreted. It carries with it also not the least element of risk.

"With its many advantages and its absence of disadvantages, it seems to me that the benefits that we derive from the von Pirquet reaction can be grouped under four headings. First, the assistance in diagnosis in single patients. Should a positive reaction be obtained, it does not, of course, necessarily mean that the symptoms for which we seek a cause are to be referred to the tuberculosis, but it compels a consideration of this as a possible factor. It may increase our difficulties by increasing our knowledge, and it does this in direct proportion to the age of the child, for the older he is the more liable is he to react. In children under a year a positive reaction must be considered of the gravest import as at this tender age the tuberculous process is practically never latent. It is not necessary for me to dwell on the use of the reaction in individuals or to answer the complaints of those who have criticised it because they were led to believe a condition tuberculous

as the result of a cutaneous test which was in reality not so. It would be too much to expect any biological test to show the difference between an active and a latent lesion. For obvious reasons the test is chiefly one for children. In the younger of these it is the positive test that is of value; in the older, it is the negative test that is of assistance. The ease of making the test and its accuracy give us the second benefit, a broader and more general knowledge in regard to the frequency of infection at the different ages than could be obtained in any other way. It shows more clearly than clinical and pathological studies could do the frequency of infection at the various ages and the almost universal infection of adults, surely knowledge of the greatest importance. We have employed the test regularly in the children's wards of Bellevue for more than a year. It is just as much a part of the routine as taking the history.

"The third benefit is in institutions and asylums where, on the basis of the cutaneous test, we may segregate the tuberculous and thus institute special treatment for them as well as protect the non-tuberculous. Those who have worked in asylums know what a veritable boon this is. The fourth benefit is in regard to the children of the tuberculous, to recognize those that are infected and treat them in order to prevent, if possible, spreading of the process. In the tuberculosis department of Bellevue, this plan has been followed for some time with very interesting and satisfactory results. All adults applying for treatment are requested to bring their children with them at a subsequent visit. All the children are tested and those not reacting are kept at home, if the hygiene of the home be good. Those reacting are examined physically to see if there is any active lesion, and if there is they are immediately placed under treatment in sanatoria or day camps. If there are no signs of an active process, they are carefully watched, put in the best surroundings possible and weighed from time to time. If they fail to gain weight, they are considered active cases and treated as such.

"By virtue of this test, then, we are assisted in diagnosis, obtain a wider knowledge of the disease in general, protect individuals and treat sufferers from the disease more intelligently and earlier than could otherwise be done. Finally, while the benefit to us remains the same, the credit to Dr. von Pirquet is far greater in that the test was developed, not as the result of a chance observation, but from the basis of sound logical reasoning."

THE NEW JERSEY STATE PEDIATRIC SOCIETY.

The New Jersey State Pediatric Society was organized in Newark on February 3d, with thirty-four charter members.

The following officers were elected: President, Dr. Henry L. Coit, of Newark; Vice-President, Dr. Alexander McAllister, of Camden; Treasurer, Dr. B. Van D. Hedges, of Plainfield; Secretary, Dr. Martin J. Synnott, of Montclair; Council, to serve five years, Dr. J. Finley Bell, of Englewood; to serve four years, Dr. T. N. Gray, East Orange; to serve three years, Dr. B. P. Craig, of Jersey City; to serve two years, Dr. Emery Marvel, of Atlantic City; to serve one year, Dr. F. H. Glazebrook, of Morristown.

The new Society is the outcome of an idea formulated several years ago by Dr. Coit, and now successfully inaugurated through the efforts of several of his enthusiastic coworkers.

The objects of the Society, as outlined in the constitution, are:—

First.—To unite the physicians of the State, who are qualified, for the scientific study of the diseases of infancy and childhood.

Second.—To promote by its concerted efforts scientific medical research in the department of pediatrics.

Third.—To foster a greater interest in pediatrics among general practitioners.

Fourth.—To study the problems of infant mortality and to popularize a knowledge of infant hygiene and of the means for the protection of child life.

The annual meeting will be held in Atlantic City, on the day preceding the convention of the Medical Society of New Jersey, when only members will attend, to hear and discuss instructive and scientific papers, and to transact the routine business of the Society. But in order that the Society may fulfill its obligation to the profession and indirectly to the public in the interest of the child, a series of meetings will be organized in four different parts of the State throughout the year, when papers, designed to instruct the general practitioner in the principles and practice of scientific medicine among children, will be read and discussed.

These papers will be presented by well-known authorities on pediatric teaching from the large cities of the United States, who no doubt will be found willing to give their time to such an educational propaganda.

CURRENT LITERATURE.

ABSTRACTS IN THIS NUMBER BY

DR. B. RAYMOND HOOBLER. DR. G. R. PISEK.
DR. C. D. MARTINETTI. DR. FRITZ B. TALBOT.
DR. S. W. THURBER.

DISEASES OF EAR, NOSE AND THROAT.

REIK, H. O.: PURULENT OTITIS MEDIA OF INFANCY AND CHILDHOOD. (*Annals of Otology, Rhinology and Laryngology*, December, 1909, p. 801.)

The question discussed is whether this disease in children differs at all from its course as observed in adults. It is true that children are more prone to this infection than adults, but this is largely due to the coexisting adenoids and large tonsils and not to a special predisposition of the infantile mucous membrane in general. As a general proposition, the author believes that it is a wise plan to remove adenoids and tonsils whenever they are found in connection with suppurative otitis media, at the earliest possible moment, and he believes that the operation should be most thorough and complete. He believes that suppurative otitis media is more destructive in early life and is followed more often by complications. Spontaneous perforations do not occur as early or as readily in children as in adults. This may be due to the more open eustachian tube and the partial drainage of secretions into the pharynx of children. Attacks of otitis in children are frequently associated with gastric disturbances.

As to treatment, it is better to open an infected tympanum by a clean incision a day too soon than too late. Operation should follow, without delay, any indications of a spread of the infection into the neighboring structures.

S. W. THURBER.

SURGERY.

KIMPTON, A. R.: DIAGNOSIS AND TREATMENT OF INTUSSUSCEPTION. (*Boston Medical and Surgical Journal*, February 3, 1909, p. 31.)

The writer believes that intussusception is a purely surgical disease. It should be diagnosed as early as possible, and operated upon immediately by the simplest and quickest means. The paper is an appeal for early recognition of the disease and immediate operation, and the writer believes that many cases are lost because of the medical treatment previously given.

FRITZ B. TALBOT.

MEDICINE.

AGER, LOUIS CURTIS: HEMATURIA, PYURIA AND ALLIED CONDITIONS IN INFANTS AND CHILDREN. (*The Archives of Diagnosis*, July, 1909, p. 280.)

Ager reports 3 cases to show how easily one may be misled in regard to the source of blood found in the discharges of children. He says blood in the urine may come from any point in the urinary tract, from the kidney to meatus, and that the amount can be roughly determined by the color of the urine. The reaction is almost invariably acid even in cystitis unless it be of the chronic variety due to pyogenic cocci when it may be alkaline. The actual presence of red cells and their relative number must be determined by a microscopical examination, and any other constituents, such as pus, casts, gravel and bacteria noted.

The general symptoms must be studied in connection with these findings. The source of simple hematuria may be in the urethra and is usually traumatic; in the bladder from papillomata, sarcomata or carcinomata, and in these instances a secondary cystitis appears early with corresponding urinary findings.

Calculi in the pelvis of the kidney are probably the most frequent cause from this region. The most frequent source of hematuria is the kidney itself. In addition to the admixture of blood, there are blood casts and many microcytes. The cause may be sarcoma and carcinoma, hemophilia, melena neonatorum, scorbutus, traumatism, nephritis, renal calculus.

A pyuria may overshadow the hematuria and in this connection an infection with the colon bacilli must not be forgotten. In a colon bacillus cystitis the urine is acid.

Hematuria and hemoglobinuria have nothing in common. The latter is usually a paroxysmal condition associated with definite vasomotor disturbances. Hereditary syphilis, eruptive fevers and malaria are causative factors.

G. R. PISEK.

LORENZI, CARLO: A CENTRE OF BOVINE TUBERCULOSIS. (*La Pediatria*, May, 1909.)

The author, in order to study the relations between tuberculosis of man and that of cattle, began a research amongst those frequently in contact with tuberculous domestic animals. In the district covered tuberculosis in cattle reached an average of 30 to 40 per cent. Pulmonary tuberculosis of the human variety is

rarely found, and the few cases examined gave reason to believe it a development of the cattle variety. The most common lesions are those of the gland and bones. In infancy scrofulous lesions are common, however. The connection between the two forms may usually be attributed to the following reasons: Common habitation with cattle in unsanitary quarters, consumption of infected meat and of milk and milk products. Lorenzi concludes that bovine tuberculosis does not produce serious lesions in the adult human being, does not tend to spread to man and usually remains localized.

C. D. MARTINETTI.

PORTER AND RICHARDSON: TWO CASES OF "RUSTY NAIL" TETANUS, WITH TETANUS BACILLI IN THE INGUINAL GLANDS. (*Boston Medical and Surgical Journal*, December 23, 1909, p. 927.)

The writers found tetanus bacilli in the inguinal glands of two patients with tetanus; in both instances the primary wound was in the foot. One died and the other recovered. They consider these findings of great importance, because, if they are confirmed, the hitherto accepted view, that in human tetanus the bacilli remain localized, must be modified. "In septic infections, the lymph glands act not only as filters, but as active germicidal protectors against a general septicemia, and their removal is contraindicated until the region which drains into them has become uninfected. In tetanus, on the other hand, the local focus can usually be thoroughly disinfected. External lymph drainage is, therefore, indicated rather than contraindicated."

FRITZ B. TALBOT.

MILLER, REGINALD: LATENT CHOREA. (*The Lancet*, December 18, 1909.)

The conclusions of Dr. Miller's paper may be summed up:—

(1) That rheumatic chorea declares itself at first by symptoms significant of general nervous instability.

(2) Before concluding that a child is suffering only from nervous disorders, the possibility of a slight rheumatic infection should be excluded.

(3) He believes that the nervous instability (latent chorea) is due to an infection already present, and may develop into a sharp attack of rheumatism or active chorea at any time.

(4) That the recognition of latent chorea in children suf-

fering from obvious acute rheumatism affords strong evidence that chorea is a rheumatic condition.

B. RAYMOND HOOBLER, M.D.

YOUNG AND RICHARDS: HEMORRHAGIC DISEASE OF THE NEW-BORN. REPORT OF A CASE. (*Boston Medical and Surgical Journal*, January 13, 1910, p. 47.)

Young and Richards report a case of hemorrhagic disease in the newborn in which there was bleeding under the anterior capsule of the liver and which they thought came before birth. The only external evidence of bleeding was a small amount of blood vomited. The anatomical diagnosis was multiple hemorrhages (liver, lungs, floor of mouth, pectoralis major muscle and peritoneal cavity).

FRITZ B. TALBOT.

HYGIENE.

FURST, MORITZ: GERMAN METHODS IN THE PREVENTION AND ARREST OF TUBERCULOSIS IN CHILDREN. (*The British Journal of Tuberculosis*, July, 1909.)

Dr. Furst regards the state protection of motherhood as of great importance, indirectly, in the prevention of tuberculosis. The state provides working women who have insured at least six months prior to confinement, with compensation for loss of work for six weeks before the birth of the child, attendance of a midwife, and medical advice, when necessary.

Lying-in women are not permitted to work in any factory or workshop for four weeks after delivery, and during the succeeding two weeks may only work if a registered medical practitioner certifies that this is permissible. This regulation has a tendency to encourage breast feeding. Many factories have nursing rooms where women who are employed may nurse their babies at regular intervals.

B. RAYMOND HOOBLER, M.D.

CONNOLLY, J. P.: SOME RESULTS OF THE WORK OF THE COMMITTEE ON MILK AND BABY HYGIENE IN BEHALF OF BABIES. (*Boston Medical and Surgical Journal*, February 3, 1910, p. 127.)

The object of the committee is to keep babies well by the oversight, by encouragement of breast feeding, by advice, by instruc-

tion of the mothers in the rules of hygiene and by furnishing at cost in sterilized feeding bottles, first-class milk, properly modified, as well as whole milk for home modification. The paper gives a very detailed description of the work. Statistics seem to show that the death rate of babies under the care of the committee is lower than that of babies who are in the same surroundings, and who do not receive this care.

FRITZ B. TALBOT.

BOOK REVIEW.

LIVING ANATOMY AND PATHOLOGY. THE DIAGNOSIS OF DISEASES IN EARLY LIFE BY THE ROENTGEN METHOD. By THOMAS MORGAN ROTCH, M.D., Professor of Pediatrics, Harvard University. Three hundred and three illustrations. Pages, 225; plates, 264. Philadelphia and London: J. B. Lippincott Company, 1910.

In the matter of beautiful bookmaking this new volume of Dr. Rotch's has few equals. Its 225 pages are illustrated by 264 plates, most of them reproductions of Roentgenographs of such superlative excellence that the merest tyro in the art can, by examining them and referring to the descriptive text, obtain nearly, if not quite, the knowledge which an expert Roentgenologist could impart. And this is Dr. Rotch's aim.

An excellent introduction discusses the characteristics of the Roentgen plate, its variation in different tissues, its applicability for purposes of diagnosis and its value in the determination of the anatomical age of the individual. The text is divided broadly into divisions dealing with normal anatomy and its application as a key to development in relation to child labor; with diseases of the newborn; diseases of nutrition; and diseases of the different regions of the body, of which there are many chapters. The plates are grouped in regard to the text. There is an excellent index, and the plates are listed both according to their occurrence and according to the age of the individual. The book contains a wealth of information about the structure, growth and development of the child and discovers much well directed and painstaking research. It is an impressive volume, whose possibilities the reader will need a long study to exhaust.

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ORIGINAL COMMUNICATIONS.

PNEUMOTHORAX: A CLINICAL AND RADIO-GRAPHIC STUDY.*

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PART II.

Paracentesis.—The production of pneumothorax during paracentesis or exploratory puncture merits consideration since it occurs more commonly than is generally supposed. Because of the absence of severe symptoms and the presence of but few physical signs, the condition is frequently overlooked. The accidental intro-

* Read by title at the Twenty-first Annual Meeting of the American Pediatric Society, Lenox, Mass., May 27 and 28, 1909.

duction of air in this way, provided no infection takes place, does not usually add to the gravity of the case, but it is not always as Stokes puts it, "a matter of trivial moment." In an appreciable number of cases it has contributed to a fatal termination. Seven deaths due to exploratory puncture of the chest are reported in the *British Journal of Children's Diseases*.⁵³ The commonest ways in which air is thus admitted are, either through faulty technique, through injury of the lung by the point of the needle or by leakage of air through the apparatus. The air usually enters from the exterior only after some of the fluid has been withdrawn. Fluids are incompressible, and it is therefore impossible to inject air into a chest already filled with fluid. Sears⁵⁹ reported 4 cases of pneumothorax due to paracentesis. In 3 of the cases there were no resulting bad effects, but in 1 the complication undoubtedly contributed to a fatal termination. Gittings⁶¹ reported 3 cases with no untoward results. In one of the cases only a localized pneumothorax followed, but subcutaneous emphysema developed in all. Variot and Roy⁶² reported the case of a girl of eleven years, who was tapped for pleural exudate. Immediately after tapping she developed pneumothorax. This was ascribed to rupture of the lung by pleural adhesions, but in all probability it was due directly to the trauma of paracentesis. Packard⁶⁴ reported a fatal case of pneumothorax due to perforation of an emphysematous bleb by the point of an aspirating needle. Emerson¹⁸ reported 10 cases due to paracentesis with five deaths. Northrup⁶⁰ reported the case of a child of two years, who was admitted to the hospital suffering from severe dyspnea and cyanosis. It was operated on for empyema, but only air escaped when the pleural cavity was opened. The pneumothorax was believed to be due to paracentesis performed before admission to the hospital.

A case of pyopneumothorax, which we believe was due to exploratory puncture, was admitted to the Children's Service of Beth Israel Hospital on September 27, 1909. The child was five years old and had had a mild attack of pertussis before the onset of the present disease. This began three weeks before admission, with fever, cough, rapid breathing and prostration. The fever was higher in the evening, and soon after the onset of the disease was associated with profuse sweats. Three days before admission the condition grew worse, the prostration became more marked, there was evidence of pain in the right chest, the temperature fluctuated between normal and 104° and the dyspnea

was severe. Before admission a puncture of the chest had been made and turbid fluid withdrawn. Examination on admission showed evidence of fluid and air in the right chest. (Fig 5.) Examination of pus obtained by puncture failed to show tubercle

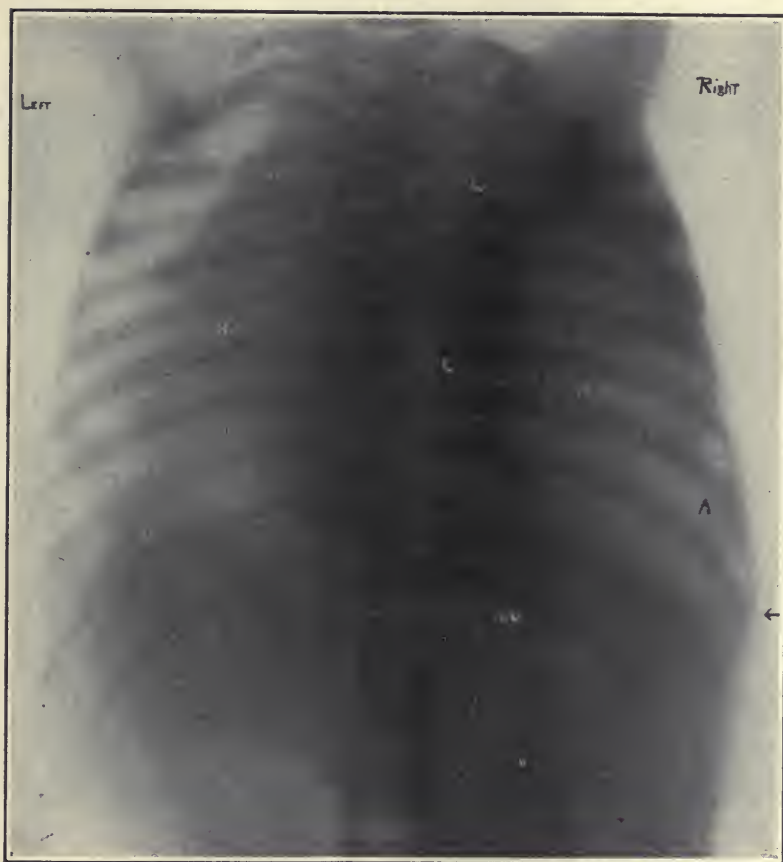


FIG. 5—PYOPNEUMOTHORAX RIGHT, VENTRODORSAL EXPOSURE. RECUMBENT POSTURE.

- (L) Collapsed lung covered by fluid.
- (AE) Pleural cavity containing both air and effusion.
- (A) Air bubble visible in the shadow of the antero-lateral part of the chest.
- (H) Heart displaced far into left chest.
- (D) Diaphragm.
- (Lv) Shadow of liver merging with that of the effusion. The arrow indicates the costophrenic space filled with fluid.

bacilli. The Moro and Von Pirquet tests were negative. The examination of the sputum did not show any tubercle bacilli. Ten days after admission thoracotomy was performed. Both air and

pus escaped. From that time on the condition of the child gradually improved and convalescence is now progressive.*

Besides this case we have seen many others due to paracentesis and some complicated by subcutaneous emphysema. Among them was a child, three years old, seen by Dr. Huber in consultation. Exploratory puncture of the left chest had been done by



FIG. 6—PYOPNEUMOTHORAX LEFT DUE TO PARACENTESIS.
VENTRODORSAL EXPOSURE. PRONE POSTURE.

- (EA) Pleural cavity containing air and effusion. Note the lighter areas of the lateral part of the chest due to the air.
- (H) Heart displaced to the right.
- (D) Diaphragm. On the right side it is at the level of the tenth rib, while on the left its shadow merges with that of the effusion.
- (C) Costo-diaphragmatic space of normal side. Compare the appearance of this space with that on the affected side which contains fluid.
- (NL) Normal lung, the seat of a compensatory emphysema.
- (S) Scapula.

the attending physician on the preceding day, because of marked dullness and feeble breathing. This procedure was followed by a pneumothorax and extensive emphysema of the back and lateral

* Since above was written, the child has been discharged cured.

parts of the chest. A careful examination revealed, furthermore, the physical signs of an effusion on the opposite side, namely, in the right pleura. Exploratory puncture establishing the presence of pus, the right pleural cavity was incised and drained. The emphysema of the left chest wall disappeared in a few days without evidence of infection. The subsequent course, in spite of the pneumothorax on the left side, was uneventful.

Empyema.—Pneumothorax produced by the perforation of a purulent effusion into the lung is not common. Such perforation occurs in the severe cases associated with gangrene of the inflammatory products and in the neglected cases. Tuberculous empyema has a tendency to follow this course. The presence of the air in the thorax may not become apparent for some time after the rupture has taken place, and even then the characteristic signs are not clearly obtained. At intervals, after severe coughing paroxysms, large quantities of foul-smelling pus may be expectorated. Comby⁶³ reported the case of a boy of eleven years, who developed pneumothorax three days after a purulent effusion in the left chest was noted. The perforation was found to have been produced by gangrenous degeneration of the pleura. Seifert⁴⁷ has reported a case in a boy of eight years due to rupture of a left empyema into the lung.

Foreign Bodies.—Direct perforation of the lung by a foreign body aspirated into a bronchus is rare. As a rule, the perforation is caused by a secondary abscess. This complication usually occurs a long time after the foreign substance has entered the bronchus, but in exceptional cases the interval may be brief. Ast's⁷⁰ case is remarkable in this respect. The patient was a girl of four years, who had aspirated a spice into the right bronchus. Bronchopneumonia, with severe pleuritic involvement, followed, and on the eleventh day, pneumothorax. In a case reported by Zuppinger⁵² of a child of two and one-half years, total right pneumothorax took place during sleep. Death followed in thirty-six hours. At autopsy the perforation was found to be due to a grain of corn which had perforated into the pleura. The foreign substance had evidently been aspirated some time before, but no history of such an occurrence had been obtained. In a case reported by Carslaw⁷³ the pneumothorax resulted from the perforation of the pleura by a plum stone aspirated into the right bronchus. Foreign bodies impacted in the esophagus have been known to perforate the pleura. Rosenthal⁷¹ reported a case of pneumothorax

due to the perforation of a bone impacted in the esophagus of a boy. In Müller's case, pneumothorax was produced by the perforation of the left pleura by round worms from the stomach.

Abscess.—Strange as it may seem, pneumothorax due to the



FIG. 7—PYOPNEUMOTHORAX LEFT. VENTRODORSAL EXPOSURE.
RECUMBENT POSTURE.

- (L) Collapsed and consolidated lung adherent to chest wall at point indicated by arrow.
- (A) Pleural cavity containing air and effusion. The greater part of this effusion has gravitated toward the upper part of the affected chest.
- (LH) Left heart. The heart is moderately displaced to the right.
- (RH) Right heart.
- (LD) Left diaphragm at level of eleventh rib posteriorly.
- (RD) Right diaphragm at level of tenth rib posteriorly.

rupture of an abscess of the lung is a rare condition. Of Biach's 715 cases, but 10 were due to this cause. Saussier¹⁵ cites 1 case, while Widal refers to 2. Gerard⁷⁴ cites a case of Trousseau's,

and states that this form usually occurs after pneumonia in children or old people. Villey⁶³ believes the condition to be more common in children than in adults. Emerson¹⁸ cites 2 cases due to metastatic abscess of the lung. In our cases the small abscess was associated with a pneumonia and empyema.

Pyopneumothorax due to rupture of an abscess of the lower left lobe into an empyema. Pneumonia of the lower left lobe. Death.

B. K., seven months old, was admitted to Beth Israel Hospital May 19, 1909, with the history of having been ill for five days with fever, cough, dyspnea and restlessness. Physical examination revealed the signs of an effusion in the left pleural cavity. On admission her pulse was 148, respiration 52, temperature 102.6°. Exploratory puncture showed turbid serum. The cytological examination of the specimen of fluid withdrawn gave 60 per cent. polynuclears and 40 per cent. mononuclears. Pneumococci were present. Because of the presence of an extensive pneumonia, it was considered best to delay operation. From this time until the date of operation, the temperature ranged from 102° to 103°, on two occasions falling to 100°, and once rising to 104° F. The respiration varied between 30 and 50, and toward the end of the week rose to 64. The pulse rate fluctuated between 120 and 140, the frequency, however, gradually rising so that at the end of the week it was 170.

A white blood count, four days after admission, showed 48,000 leucocytes, of which 82 per cent. were polynuclears and 18 per cent. mononuclears. Six days after admission, on the eleventh day of the disease, vomiting and eructation appeared, which persisted to the time of death. Examination at this time showed an increase in fluid, and an exploratory puncture revealed pus. For about eight hours the condition remained unchanged, and then suddenly grew worse. Examination now showed the presence of air and fluid in the left pleural cavity. (Fig. 7.) In spite of all treatment the vomiting and eructation grew worse. Simple incision and drainage of the chest failed to give any relief. The day following the operation the blood examination showed 42,000 white blood cells, with no appreciable change in the differential count from the last examination. The temperature vacillated between 97° and 104° F., pulse varied from 120 to 170, and respiration between 34 and 60. The condition gradually grew worse, the restlessness was marked, the vomiting and eructation were persist-

ent, muscular twitchings appeared, and eleven days after admission (sixteen days after the onset) the child died.

Only a limited autopsy was allowed. The empyema cavity was found fairly large, and apparently walled off by adhesions above on the level of the fourth dorsal spine and anteriorly about the anterior axillary line. The cavity was traversed by a few bands. The left lung showed marked consolidation of the lower lobe. About midway between the fissure and the lower border, and one inch from the posterior border, a cavity was detected, 1 cm. in diameter. The edges of the cavity were smooth; it communicated freely with the empyema cavity and was lined by pyogenic membrane, $\frac{1}{16}$ of an inch thick.

From these findings it is evident that a small abscess of the lung had set up a suppurative pleurisy, limited at first, but gradually extending, and finally, in consequence of the intractable vomiting, the adhesions had given way with the production of the pneumothorax. The exploratory puncture had been made in the usual manner, posteriorly and below the angle of the scapula, and could not in any way have caused the perforation. Previous to the autopsy, the suspicion may have existed that the pneumothorax was due to the second exploratory puncture. The postmortem examination, however, proved this suspicion to be unfounded. The wall of the abscess cavity was not a recent one, the granulation tissue being of considerable thickness. The pleural cavity did not communicate with the lung through a narrow fistula, but directly by a wide opening. These conditions are not found in pneumothorax due to paracentesis. On the other hand, the autopsy showed that the abscess was a superficial one, associated with a pneumonic process and accompanied by a purulent effusion. The empyema was sacculated, as it very often is in infants, and the exudate contained considerable fibrin, a condition usually present in pneumococcic infections. These factors would have been sufficient under ordinary circumstances to minimize the possibility of the rupture of the abscess had not the strain of the persistent vomiting acted as an excitant.

Bovaird⁴⁰ reported the autopsy findings in 2 similar cases. In 1 case the child was four months old, and the right pleural cavity contained, in addition to the air, about $1\frac{1}{2}$ ounces of thin muddy fluid. The right lung was compressed, and in its lower lobe were found two small abscess cavities about 1 cm. in diameter. One of these had perforated the pleura and produced the pneumothorax.

In the other case the infant was six months old. There was left pneumothorax, and in the left upper lobe there were scattered pneumonic areas. On the anterior surface of this lobe a thin walled abscess cavity had ruptured into the pleura. The lung about this abscess was consolidated and compressed.

Pertussis.—Aside from the bronchopneumonia, which is a frequent and serious complication of pertussis, vesicular emphysema is present in all severe cases. As in diphtheria, these complications predispose to the production of pneumothorax, only to a greater degree. It mostly occurs, however, in debilitated children, and the process is often hastened by the combination of an inflammatory condition superimposed upon the already weakened and emphysematous lung. Thus in a case reported by Wino-couroff⁷⁵ a child, four years old, after suffering from pertussis for one month, developed a croupous pneumonia, and on the third day of this disease, after a severe attack of coughing, developed pneumothorax. In Malinowski's⁷⁶ case the pneumothorax followed a paroxysm of coughing, excited by compression of the chest. In von Gelmo's⁷⁷ case the pneumothorax was accompanied by subcutaneous emphysema. In a case reported by Villy,⁷⁸ a child, three years old, convalescing from diphtheria, developed pertussis and very soon after a pneumothorax.

Diphtheria.—Diphtheria is a disease in which pneumothorax is not an infrequent complication or sequel. There are three complications which are rather frequent in diphtheria. The first is bronchopneumonia, which is usually of the severe type; the second is emphysema, vesicular or interstitial, and this is more common if the larynx is affected; the third is thrombosis or embolism, which may affect the vessels of the lung. These pathological conditions all predispose to the production of pneumothorax. Zuppinger⁵² reports several cases in which the sequence was diphtheria, infarct, gangrene and pneumothorax. Steffen⁷⁹ reported 2 cases complicating diphtheria: one in a child of one and one-half years was due to rupture of an emphysematous lung, and the other, in a child of five years, to softening of an infarct. Schwalbe's⁸⁰ case was a diphtheric child, who developed subcutaneous emphysema and double pneumothorax six days after a successful tracheotomy had been done. Torday⁸¹ reported a case which followed laryngeal diphtheria. Cnopf⁸² reported 4 such cases during the course of laryngeal diphtheria.

Measles.—The bronchopneumonia complicating measles is usually severe and may have associated with it the pathological conditions which predispose to rupture of the lung, namely, emphysema, gangrene and abscess. Zuppinger speaks of the frequency of pneumothorax during the course of severe measles. Steffen reported a case in a girl of seven years due to rupture of a small abscess. Bovaird reported 2 cases occurring during the course of measles. One was a child of four years, who, on the ninth day of measles and bronchopneumonia, went into collapse suddenly with cyanosis and dyspnea. The examination revealed a right pneumothorax. At autopsy the pleura contained about an ounce of pus, the lung was compressed and consolidated and contained bronchiectatic cavities filled with pus. The other patient was a boy of three, the pneumothorax developed on the eighteenth day of the measles. Following an exploratory puncture, subcutaneous emphysema developed, which spread over trunk and arms. At autopsy a perforation was found in the lower left lobe.

Symptoms.—At the instant of the occurrence of the perforation, there is severe pain with evidence of respiratory and circulatory disturbances and shock. Elsberg⁸⁴ has proved experimentally that these symptoms are in great part due to the displacement of the mediastinal contents, which lose their support through disturbance of the equilibrium of the air pressure within the thorax. In children these symptoms are unusually severe. This is due to the mobility of their mediastinal structures. The onset is usually sudden, with severe pain, dyspnea, cyanosis and shock. As the viscera accommodate themselves to the changed conditions within the thorax the alarming symptoms subside.

It is surprising to note how quickly in many cases, particularly in older children and adults, a tolerance to the presence of air in the pleural cavity is established. Even with one lung compressed by fluid and the heart displaced, these patients are often comparatively comfortable and have but little dyspnea. This has ever been a source of wonder to clinicians. Houghton⁸⁵ in 1832 reported the case of a laborer with left pyopneumothorax, who went cheerfully about his vocation, though the succussion splash from his chest could be heard as he walked downstairs. Adams⁸⁶ reported a case in which the pneumothorax, which resulted from a slight strain, persisted without exudate or infection for a period of four years without any marked inconvenience.

Physical Examination.—The child, as a rule, prefers to lie on

the affected side. When the dyspnea is severe, the activity of the accessory respiratory muscles is evident. Inspection will show that one side of the chest is more or less immobile and distended. The lower ribs flare out, the intercostal spaces are widened and the depressions obliterated. The hypochondriac region corresponding to the affected side is prominent.

The cardiac impulse is displaced, and, if the left chest be affected, the heart impulse may be seen to the right of the sternum, even as far as the mammary line, and distinct epigastric pulsation will be noted.

The information gained by inspection is not characteristic of pneumothorax, since simple effusion often gives a similar picture.

Tactile fremitus is a sign not easily obtained in older children. It will, however, usually be found absent or diminished in intensity.

Percussion must be gentle, for the air in the chest makes it a sounding-board which readily exaggerates and transforms every sound and obliterates the finer differences of tone. With the exception of an area in the upper intrascapular region, the entire chest may be tympanitic from apex to base. This note will also be obtained below the level at which pulmonary resonance may be elicited normally. This is a valuable sign, and in doubtful cases will be of great service. Less frequently the note may be either hyperresonant or normal over the entire chest. There is usually an area of normal or relatively dull resonance in the intrascapular region. This is due to the more or less collapsed lung lying at its root. When the pneumothorax is due to phthisis, the apex may be adherent, and then a normal or relatively dull note will also be obtained over the upper part of the chest. Infrequently a cracked-pot sound may be elicited. The absolutely flat note generally associated with effusion in the pleural cavity is seldom obtained when the effusion is associated with air; for this reason a small amount of fluid usually escapes detection, while even in the presence of a large amount it is rarely possible to accurately map out its upper level. The dull note when present will be found to shift with the position of the patient. Though this movable dullness may at times be present in simple effusion, yet in no other disease is the phenomena so marked and constant as in pneumohydrothorax.

The signs obtained by auscultation are variable and misleading. In infants the auscultatory signs differ from those in adults.

The respiratory murmur is usually unchanged and succussion is seldom elicited. The metallic and amphoric qualities which the respiratory sounds possess in older children and adults are absent in infants. In older children the respiratory murmur is either



FIG. 8—RIGHT PYOPNEUMOTHORAX. VENTRODORSAL EXPOSURE.
RECUMBENT POSTURE.

- (E) Effusion.
- (L) Partially collapsed lung adherent to posterior chest wall and unable to retract completely.
- (H) Heart displaced to the left.
- (Lv) Shadow of the liver merging with that of the effusion. Compare the costo-diaphragmatic spaces. Note the presence of fluid in that of the right side.

entirely absent or feeble and distant. When the pneumothorax occurs in a previously healthy pleural cavity, and the lung is not diseased, the breath sounds may be harsh and loud. Whether

feeble or intense, the respiratory murmur usually has an amphoric quality. This amphoric sound may be heard only over a certain part or over the entire affected chest. It is most frequently heard with expiration. In the intrascapular region the breathing may be tubular. The vocal resonance has a marked amphoric quality, and this may be present even when the respiratory murmur is absent. The so-called "metallic tinkle," which is really a râle with its pitch raised by the resonating air chamber of the pneumothorax, may be heard at the end of expiration or during coughing. By using one coin as a plexor and one as a pleximeter, auscultation will reveal that the sound produced by the contact of the coins has been transformed into a clear musical sound, like the note of a bell. This phenomena, first described by Trausseau, has been called the "coin sound," and was considered pathognomonic of air in the pleura. Osler,³³ however, obtained this sound over a large cavity just underneath the pleura of the upper lobe. It cannot be denied that it is a sign of great value in children, in whom large cavitation of the lung is a rare condition. Over the fluid no respiratory sounds are obtained. By shaking the child, either in the recumbent or erect posture, the ancient sign "*Succussio Hippocratis*," a splashing sound may be heard if the amount of air associated with the fluid is not too small.

Examination with the Roentgen Ray.—The value of the Roentgen ray examination, in the study of the varied conditions present in pneumothorax, cannot be overestimated. It gives such accurate information concerning certain of the pathological conditions as is not obtainable in any other way. It makes possible the visual examination of the movements of the affected viscera and permits the systematic study of the progress of the disease. Valuable as this examination is, however, in furnishing important data, it should not be considered as a procedure which is to replace the older established methods of diagnosis, but rather is it to be held as a supplementary diagnostic method of undoubted accuracy. The difficulties which present themselves in the diagnosis of pneumothorax demand that all the diagnostic means at our disposal be employed in the effort to obtain a true idea of the conditions existing in this disease.

The examination may be made either with the aid of the fluorescent screen (Roentgenoscopy), which permits the study of the movements of the thoracic viscera, or a record of the pathological

conditions may be obtained upon the photographic plate (Roentgenography). Both methods are to be employed, and the examination cannot be considered complete without either. For no description, however accurate, of the fleeting image seen upon the fluorescent screen can compare as a graphic record with the permanent impression on a photographic plate, which also gives the finer structural detail not to be seen with the screen. The picture of pneumothorax is so striking and characteristic that once seen the condition is thereafter easily recognized.

For the clear understanding of the conditions within the affected chest, information is necessary regarding the following points, upon which the Roentgen ray examination gives the required data:—

First.—Degree of Pneumothorax.—Has the air invaded the entire cavity or is it confined by adhesions to a particular part of the chest? The shadow of the normal lung as compared to that cast by the spine and mediastinal structures is bright, because the ray penetrates the air-containing tissues with greater ease than it does the dense structures. So also the shadow grows brighter during inspiration. With respiration, the movement of the normal lung shadows are visible. When air is present in the pleural cavity, however, the whole one part of the chest will be brilliantly illuminated. The ray will so affect the screen or plate as if nothing had been interposed in its course. The contrast between the part thus illuminated and the central dense structures is now very marked. Closer examination of this brilliant area will show that the normal lung markings are absent, while midway in the chest and against the spinal column an irregularly oval shadow with a well-defined outline will be noted. This shadow may enlarge and grow lighter during one or the other phases of respiration. The brilliantly illuminated part of the chest is that in which the pleural cavity contains air, while the mobile shadow against the spinal column is the more or less collapsed lung. Because of this collapse the penetration of the ray is facilitated, thus accounting for the brightness of the affected chest. The lattice-work effect of the ribs over the bright area is very clear, very distinct and of a lighter shade than the ribs on the normal side, while the structural detail of the ribs over this bright area are more clearly visible than on the normal side. The costo-diaphragmatic space is sharply defined and should always be examined for the presence of effu-

sion. When, as in Figures 1, 4, 10 and 11, the air occupies every part of the pleural cavity, this characteristic appearance is present over the entire side, while if the air is localized only a circumscribed part of the chest will give the picture. The only other appearance which may simulate that of a localized pneumothorax is a cavity in the lung. In the latter condition, however, the con-

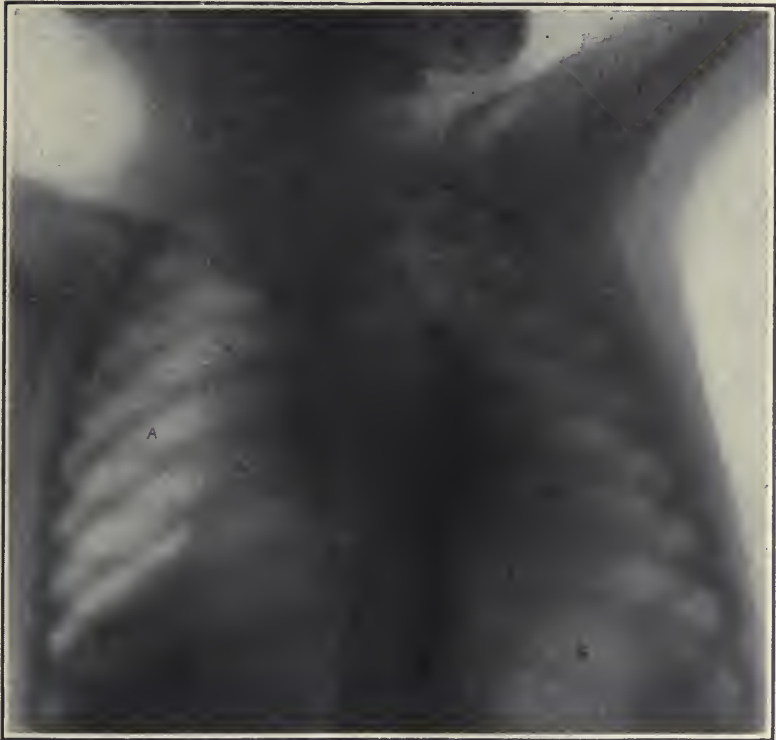


FIG. 9—PNEUMOTHORAX RIGHT. DORSAVENTRAL VIEW.
(PLATE TO STERNUM.)

- (L) Collapsed lung.
- (A) Air in pleural cavity.
- (D) Diaphragm.
- (H) Heart displaced considerably to the left.
- (S) Stomach—distended by gas.

trast between the normal and abnormal tissue is not so marked and the lighter area indicating the lung cavity is surrounded by a distinct ring of dense shadow corresponding to the cavity wall. Examination by the oblique method will also be of value in this differentiation.

Second.—Condition of the Lung.—Is the lung normal or diseased? Is it completely or only partially collapsed? Tuberculosis, pneumonia and abscess are all demonstrable. When the lung is completely collapsed it may be impossible to definitely demonstrate the diffuse infiltration of a tuberculosis, but in such a case evi-



FIG. 10—Pneumothorax. To show the collapsed lung (L) lying as a ribbon-like mass along the spinal column. Note the distinctness of the ribs of that part of the pleural cavity (A) containing but air. (CS) Indicates the costo-diaphragmatic sinus.



FIG. 11—Pneumothorax. To show a collapsed lung which still contains considerable air and which was observed to distend and shrink with respiratory movements.

dences of this disease will usually be found in the other lung. A large area of consolidation will not permit the lung to collapse to a marked extent. Occasionally the clue to the pathological primary process is derived from the condition of a part of the lung adherent, and therefore unable to retract. The lobes of the collapsed lung may be differentiated (Fig. 4), and in some cases one or other of the lobes not only contains more air, but distends to a greater extent during respiration. It is perhaps not an unjustified assumption that the more collapsed and more immobile lobe bears the perforation.

Third.—Position and Mobility of the Lung.—What is the position of the retracted lung? Does it functionate? If free to collapse, the lung is always found lying at its root. For some time after the perforation has occurred, the collapse is not complete. The lung still contains considerable air and casts a distinct shadow of considerable extent with a sharply defined border. When the causes which make for restitution are not at play, then the air in the collapsed lung is gradually absorbed; and as this progresses, the lung continues to shrink, so that in old cases it is to be seen lying airless and motionless, a ribbon-like mass, along the spinal column, as in Figure 10.

In closed pneumothorax, when the lung takes an active part in respiration, its appearance is as shown in Figures 4, 9 and 11. In these cases the lung may be observed during respiratory movements to expand from its shrunken state, distend so as to almost completely fill the chest, and then retract to its former partially collapsed condition at its root. Under certain conditions this movement of the partially collapsed lung is what is termed paradoxical; that is to say, instead of dilating with inspiration, the lung is inflated during expiration, and it is this expiratory force derived from the intact emphysematous (compensatory) lung which is the important factor in the restitution of conditions to the normal.

Fourth.—Condition of the Pleura.—Does it contain effusion? The difficulty of detecting by the usual diagnostic means, either the presence or the amount of effusion within a pleural cavity containing air, is well known to every clinician. With the aid of the Roentgen ray the smallest effusion may be detected. The costodiaphragmatic space should first be examined, and if this is clear there is no free effusion. The picture of the chest in

hydropneumothorax will show three zones of shadow which differ in the intensity of their illumination. (Fig. 2.) There is a bright upper zone, a brilliant middle zone, and a dark lower zone. The bright upper zone corresponds to a part of the collapsed lung retracted and pressed against the upper and posterior part of the chest. The middle brilliant zone represents the part of the chest containing air. The contrast between this zone and the dark zone beneath it is very marked. This lower zone represents the fluid. It is a dense homogeneous shadow which may obscure the shadow of the ribs. Below it merges without any defined boundary into the shadow of the liver, while its upper level is sharply defined and perfectly horizontal. This upper level is sharply defined no matter how small the quantity of air. In simple effusion, on the other hand, there is no sharp line of demarcation at the level of the fluid, but the shadow of the latter gradually merges into that of the compressed lung. This level of the fluid in hydropneumothorax remains horizontal whatever the position of the thorax. When the effusion occurs late, that is, after the collapsed lung has become airless, or if the condition is an old one, then but two zones will be seen, an upper brilliant zone corresponding to the air and a lower dark zone corresponding to the fluid. The lung in these cases lies against the spinal column and its shadow merges with that of the mediastinum. This is the picture when the patient is examined in the upright position. With children, however, it is usually neither feasible nor advisable to examine them in the erect posture, and almost impossible to Roentgenograph them in this position. But when lying down, in which position they are best examined, the fluid flows over the posterior wall of the chest, while the air rises above it. The picture now obtained is a little more difficult of interpretation. (Fig. 3 and Fig. 5.) Instead of two sharply contrasted zones indicating the air and fluid, the entire chest is obscured by a light shadow, and it is only at the sides that the brilliant illumination due to the air is visible. The lung, however, still holds its position at the root. The motion of the fluid in response to the movements of the chest, diaphragm and heart has already been discussed. The paradoxical movement of the fluid may be studied. So passive is the diaphragm in some of these cases that sudden pressure upon the abdomen will cause a rise of the level of the fluid,

Fifth.—Position and Movement of Diaphragm.—What is the position of this muscle, and how and to what degree is its motion affected and limited? Once retraction of the lung occurs, the movements of the diaphragm are inhibited, and its dome becomes flattened. When the lung is collapsed to a marked degree this muscle appears to lose its tone and passively rises and falls in response to the movement of the abdominal viscera. Its movement under these conditions is the reverse of its normal action.

Sixth.—The Position of the Heart.—Are the mediastinal contents displaced, and to what extent? The position of the heart may serve as an index to the amount of air in the pleural cavity, for the greater the quantity of air the greater the displacement. The displacement is more marked when the left pleural cavity is involved, and when there is effusion in addition to the air. In disease of the left pleura, the entire heart may be pushed into the right chest. Under these circumstances there is also a rotation of the organ, so that the left ventricle lies more anteriorly. A dilatation of the pulmonary artery and left auricle may be noted.

Seventh.—The Condition of the Chest Wall.—Are fractures present? A fracture must be looked for in all cases due to trauma. The patient should be examined in all positions, and in children the parts of the ribs at the epiphyseal junction should be carefully examined.

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MENINGITIS AND CONDITIONS SIMULATING MENINGITIS.*

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Just one hundred years ago, in the city of Edinburgh, a quaint little maid beloved of all lovers of children, Pet Marjory (Marjory Fleming), at the age of six years immortalized herself by putting pen to paper in the beginning of a journal whose pages still shine with no less lustre than those of her worshipful and worshipping friend and admirer, Walter Scott. Three years more and the inexorable fates had severed the thread of life whose warp and woof, shot with splendid promise, was still rich in the web.

An attack of measles, a convalescence fairly established, and then, to quote the words of her loving biographer, Dr. John Brown, "She went to bed apparently well, awoke in the middle of the night with the old cry of woe to a mother's heart, 'My head, my head.'" Three days of the dire malady, water on the head, followed, and the end came.

This cry of woe pierces the mother's heart with anguish no less poignant to-day than it did Marjory's mother's one hundred years ago; but there is a long thin lift of light in the East of this black night of despair that reads the dawn of a day of knowledge. What may be deciphered by this dim light lies within the province of our paper this evening.

It is not my purpose to enumerate and discuss the possibilities of cerebral involvement in childhood, nor to dwell on cases foreign to my own experience, but to cull out of a fairly rich hospital material the kind of cases that you and I are likely to meet in our practice and give you some of the impressions they have made on me.

In the child symptoms referable to the brain are in the vast majority of cases to be attributed to meningeal involvement; a meningitis. I shall devote myself especially to a consideration of these conditions.

There is one type of meningitis that year in and year out dwarfs all others; that is the tuberculous. An exception to this statement may be taken only for brief intervals on the compara-

* Read before the William Pierson Medical Library Association in Orange, N. J.

tively rare occasions of an epidemic of cerebrospinal meningitis.

In the absence of such an epidemic were you to name all true meningitides tuberculous, you would be right in the vast majority of instances; but such slipshod statistical gambling affords no intellectual satisfaction, sharpens no clinical sense and brings humiliation all too often. Yet this knowledge tempers the inclination many of us unfortunately have of always seeking the unusual in the commonplace, hunting ichthyosauri, as one of my hard-headed medical friends puts it.

Children are susceptible to tuberculous meningitis at all ages, though in the first few months of life it is relatively rare and grows less common in the late years of childhood.

It is, of course, more common in children of a frankly tuberculous environment; in fact, meningitis occurring in a child of such an environment is almost surely tuberculous, the history of exposure thus affording us one of the most important data in the diagnosis.

The mode of onset of tuberculous meningitis differs a good deal. That it is insidious, as the books put it, but illy expresses the truth. It presents a different picture in the older and in the younger children, in part due, perhaps, to the ability of the former to call attention to and to express the earlier manifestations of the disorder.

A child of eight, dying in my ward at Bellevue last month, illustrates one common mode of onset among the older children. She was well up to four weeks preceding admission, then she began to be listless and tired; in another week she complained of headache, in still another week began to have vomiting spells, and in the fourth week sank into a stupor.

These changes in the character and habits of children, so proverbially full of life, so impatient of restraint, so ceaselessly active that the day is not long enough to encompass half their desires, into a listlessness that neglects play, into a constant demand on the mother's attention and affection, and into peevishness, fretfulness and irritability, should always sound a note of alarm. These are among the earliest signs of the invasion of the tubercle bacillus in the development of general miliary tuberculosis or tuberculous meningitis.

In another class of cases, as a rule younger children, for example, one occurring in a child of three and a half in the ward at the same time as the one just cited, the onset is more rapid.

Nine days before admission listlessness, apathy, and in two or three days one or two vomiting spells and then increasing stupor.

When she is admitted the disease has already set its stamp upon her. This earlier vomiting with prompt cessation is not uncommon.

Again, and especially among young children, the onset may be as abrupt as in cerebrospinal meningitis, beginning with a convulsion and with fever and taking the child in full health.

Still again the meningitis is the last member of a series of events expressing tuberculosis elsewhere or of acute miliary tuberculosis and, indeed, may be the first to tell the true significance of the previous disturbances.

One of my private cases, a child of three, illustrates this well. She was in excellent health up to two and a half years, then began to lose flesh slowly and without apparent cause all summer. This was followed by a mild grade but intractable gastroenteritis through the fall; then a persistent cough set in, but without physical signs in the lungs to account for it, and then the meningitis.

Finally, another mode of onset characterizes, in my experience, the majority of cases in infancy. They simply become listless and apathetic until the stupor becomes so marked and so characteristic that it suggests the diagnosis at once.

The successive stages described by the text-book one rarely sees. To be sure, the symptoms change as the disease progresses, but that is a very different picture from the schematic three stages, each with its peculiar group of symptoms.

In older children the description of the books is more closely approximated, but in infants the picture differs widely.

To detail the symptoms in the infants first as they impress me, there are four of prime importance: (1) apathy; (2) tremor; (3) irregularity of respiration; (4) ocular palsies.

Most constant and most impressive of all the symptoms seems to me to be the evidence of impairment of consciousness, running all the way from listlessness, through apathy and stupor, into coma.

A child of six to eighteen months, and often previously healthy (and how often these children seem to be stricken out of full health is a source of astonishment to me), who lies entirely indifferent to its surroundings, to strange faces and even to examination, is so rare a condition, unless expressing an unusually

severe acute infection, such as some pneumonias, that it fixes the attention on the brain at once as the seat of trouble.

I have seen no delirium in these children and but rarely have heard the cephalic cry, but this is a little more common in the older children.

Next in importance is the peculiar little fine tremor of the extremities, especially the hands, that surely bespeaks cortical irritation. There is another symptom of a kindred nature referable to the upper extremities, which I have described to my students, for want of a better term, as "half sketched voluntary movements." It is as if the child started to do something with the hand and paused half way. This movement elicits or aggravates the tremor. The tremors become much coarser, more exaggerated and more generally distributed when the child is suddenly or roughly handled or in testing the rigidity of the neck.

The irregularity of respiration is a little less constant and perhaps later than the first two, but very significant.

It must be sought for before the child is disturbed by examination. The respiratory curve rises and falls, suggesting remotely but only in the minority of cases closely approximating the Cheyne-Stokes type of breathing. An occasional deep-drawn sigh is a frequent and significant variation.

The ocular palsies are the most constant, earliest, and often the only focal symptoms. These paralyzes vary greatly and often vary from day to day. There are squints internal or external, momentary lagging of one ball behind the other in the effort to focus, and ptosis, all demonstrating the external ophthalmoplegia, while the pupils may be widely dilated, sharply contracted, unequal in size and react sluggishly or not at all to light.

Please remember that I am not consulting any text-book in my description; that you can do as well as I; but am giving you my personal impressions. Now to hastily review the symptom upon which more stress is usually laid—the slow and irregular pulse. This I have observed far less frequently than my preconceived notions had demanded, but I believe it of the highest diagnostic import when present.

Stiffness of the muscles of the neck is in my experience more often absent than present in infants, but a moderate amount of retraction of the head may be noticed, even when the rigidity is not elicited.

Opisthotonus is exceedingly rare.

Kernig's sign is usually absent.

The knee-jerks vary a great deal; are often absent, often increased.

The scaphoid abdomen is not a common phenomenon in infants.

The vasomotor tache is almost constantly elicited and is marked.

Local palsies occur from time to time; in the face most frequently and in the extremities much more rarely.

Convulsions after the onset have been the decided exception with my cases, though I recall examples vividly.

Hyperesthesia is another feature of the disease that varies a good deal and seems to me to be much more common in the older children.

The temperature is apt to be rather low, with considerable excursion.

In the older children the picture more nearly approximates the type of cerebrospinal. There are rigidity and retraction of the muscles of the neck, Kernig's sign, scaphoid abdomen together with ocular palsies, respiratory, circulatory and vasomotor disturbances. Stupor predominates, but excessive irritability, fretfulness and crying are easily elicited.

The hyperesthesia is often marked.

As every practitioner knows, the "type" picture of a disease fits only the majority of cases (if it really does that) that come under observation, while the difficulty lies in catching the hints that a scanty symptomatology offers and finding some method to confirm or confute his suspicions. It is of these methods that I wish to say a few words. They consist of:

1. Blood counts.
2. Ophthalmoscopic examination.
3. Search for tubercle bacilli in sputum or elsewhere.
4. Tuberculin reactions.
5. Spinal fluid examination.
6. Serum reactions.

The blood count in tuberculous meningitis has, in my experience, been found to deviate considerably from that obtained in other tuberculous conditions. The typical blood count in slowly advancing tuberculosis of one or other structure shows a leukopenia, a normal number or one but slightly increased, while in tuberculosis of the meninges there is usually a fairly marked in-

crease. In 32 cases taken from my service the figures run from 6,700 up to 38,000. Of the whole number, 26, or 81 per cent., are over 13,000.

The polymorphonuclear increase seems to me even more striking, when one recalls the relatively low polymorphonuclear percentage of childhood, and would suggest the reaction to one of the more common pyogenic organisms.

The points to be remembered are that the total count and differential is higher than in other tuberculous conditions and that because high it cannot be differentiated from pyogenic conditions, nor yet is it to be considered as exclusive of tuberculosis of the meninges.

Of the ophthalmoscopic examination I can only plead guilty of a neglect of a measure that I am inclined to believe would yield results commensurate with the trouble taken. I have made these examinations a few times only and with negative results, but am encouraged by Valude's short paragraph in Grancher and Comby's *Traite des Maladies de l'Enfance* to make a more determined search for small but clearly distinguishable tubercles on the choroid.

In that group of cases in which the meningitis is secondary to pulmonary tuberculosis, it may be possible to obtain the tubercle bacillus from the sputum. I am sorry to say that the efforts made in my own service to isolate the bacillus from the sputum has not met with as much success as I could wish, owing I believe to a lack of time on the part of an overworked house-staff to persist in a search that rewards only patience and the leisure to exert it.

The usual method pursued to obtain the sputum is to roll absorbent cotton about an applicator or wooden tongue depressor and swab the back of the throat. The process is pretty sure to provoke coughing with expulsion of sputum against the swab.

From this spreads can be made. Another method is, after provoking a cough, to pass a stomach siphon or catheter a few inches down the esophagus. The sputum just swallowed will adhere to the sides of the tube.

Of the examination of the stools for tubercle bacilli, as advocated by Rosenberger, I have had no experience in my Bellevue service, but at St. Luke's we made a few examinations with negative results. I would not attempt to pass judgment on the value of this method, but I think it fair to say that the search is not as easy or as fruitful as one might be led to suppose after perusing Rosenberger's article.*

* "The Significance of Tubercle Bacilli in the Feces," *American Journal of Medical Sciences*, December, 1907.

What makes this method relevant to our discussion is that the investigator claims to have discovered the bacilli in the stools of a case of meningitis.

The same author has an article in the February number of the current year of the *American Journal of Medical Sciences*, "The Presence of Tubercle Bacilli in the Circulating Blood in Tuberculosis." His results are truly startling and, if correct, of the utmost importance. I am cognizant of work done in this city in an effort at corroboration, with negative results, but the workers are unwilling to express any opinion as to its value at this early period.

You are all familiar with the new tuberculin reactions. Of these the oldest, the subcutaneous method, dependent for its recognition on a rise of temperature, is, of course, not applicable in a febrile condition like this.

The Wolff-Eisner, more commonly known as the Calmette or eye reaction, entails risk when the conjunctiva is inflamed, as it frequently is in tuberculous meningitis. I have seen lamentable results in an adult, a condition obtaining that was declared by a well-known ophthalmologist to be indistinguishable from tuberculous conjunctivitis.

When this test was first introduced I applied it to 103 consecutive admissions to my ward. I obtained 4 positive results and 2 questionable ones. Of these positives 1 was a tuberculous meningitis. Among the 97 negatives 2 were proven tuberculous meningitis cases. Why these were negative I will touch upon presently.

Of the more recent cases none were tested from fear of doing damage to the eye, which unfortunate issue we escaped in the first series.

The best test is the Von Pirquet or cutaneous test. This consists of a vaccination with a saline solution of crude tuberculin. We applied this test to 99 cases of the series quoted above, using 25 per cent. solution in one place, the pure tuberculin in a second, and scarified a third as a control. The reaction consists in the appearance of a papule surrounded by a red areola in about twelve hours. I had eight positive reactions and nine questionable ones. Of the eight positives one was a tuberculous meningitis. Of the nine questionable one was a tuberculous meningitis. Of the eighty-two negative one was a proven tuberculous

meningitis. I will add that this series gives a very much lower percentage than is reported by most investigators.

Of the more recent cases 5 were tested and 2 reacted positive, though 1 but slightly.

Of 8 cases, then, 2 were frankly positive, *i.e.*, 25 per cent., and 1 was slight and 1 was doubtful.

The fourth method, Moro's, consists in rubbing thoroughly into the skin an ointment of tuberculin. It is said to give as good results as the Von Pirquet. I have had no experience with it.

Any latent form of tuberculosis will respond to the Von Pirquet test, so that the vast majority of adults will react, but in young children and more especially infants, in whom time for healing processes has not elapsed, the positive reaction has great significance.

It will be noted that 4 cases, or 50 per cent., failed to react in any way. This failure to react in any case of tuberculosis increases with the acuteness and virulency of the process and expresses an inability of the body to react against, that is, cope successfully with, the infection. We see this especially in acute miliary tuberculosis and the disease under discussion.

Of all evidences of tuberculous meningitis, none are so certain as the recovery of the tubercle bacillus from the cerebro-spinal fluid.

The characteristics of the fluid make a diagnosis almost certain. It comes out under pressure, spurting or flowing in a steady stream instead of drop by drop as from a normal canal. (Normal pressure 120-180 mm. water. In tuberculous meningitis 250-500 mm. water.) It is increased in quantity, 30 to 45 to 60 cc., and even more. The normal in infants is 10-20 cc. and in older children 15-25 cc. It is clear or slightly hazy or opalescent, sometimes quite markedly so. It forms on standing a characteristic spider-web coagulum, in the middle of the test-tube, from which, when it is teased out on a slide, the tubercle bacilli may be recovered. Sometimes, if centrifugated when freshly drawn, the sediment will readily yield the organism.

The cells in the fluid are increased. In the normal fluid the cell count is rarely above 5 per c.mm.

In tuberculous meningitis it is usually over 100 and even up to 1,000 per c.mm., and as many as 500 have been recovered from a perfectly clear fluid.

Among my figures are one of 62, another of 120, another of

410. This count is of considerable diagnostic value. Most of these cells are lymphocytes. Some of my figures are: Polymorphonuclears, 8; lymphocytes, 92; 19-81; 5-95; 20-80; 3-97.

The albuminous content is increased considerably above the normal, .02-.05 per cent. Some of my figures are .09 per cent.; .08 per cent.; .03 per cent.

It is pleasing to note in how large a percentage of clinically distinct cases the tubercle bacillus is recovered from the fluid. These examinations have been made under Dr. Charles Norris, pathologist to Bellevue Hospital. In going over my own cases of the last three winters, my service lasting from October to June, I have collected 50 cases, and find 47 positive returns. That is, the tubercle bacillus has been recovered from the fluid in 94 per cent. of the cases. I know of other equally good statistics in New York, and when one reads in the last edition of Pfaundler and Schlossmann's *Handbuch der Kinderheilkunde* that the bacillus may be recovered in 30 to 50 per cent. of the cases, we feel well satisfied with the work that has been done for us.

In the cases that fail, the guinea-pig might still clear the matter up for us at last.

Serum reactions. The agglutination of the tubercle bacilli by the serum of tuberculous patients, as advocated by Paul Courment and Arloing, and studied here by Trudeau's workers, Twichell and Kinghorn, fails in tuberculous meningitis, probably for the same reason that the Von Pirquet fails.

The second important form of meningitis, the epidemic cerebrospinal, has occupied our attention much of late, because of the extent of the last epidemic, the numerous reports that have led to a reconstruction, to no inconsiderable extent, of the clinical picture, and most of all because of the serum-therapy elaborated by Dr. Flexner.

In a great epidemic one sees every degree of severity of the disease, from types so mild that, as in one infant in my ward, one would not think of examining the confirming spinal fluid but for the presence of the epidemic, to fulminating cases fatal in a few hours.

It is tempting to dwell on this variety, but as its occurrence at present is infrequent (I have had no case in my wards this winter), as it has been so thoroughly described of late, and as I have yet to deal with types more likely to fall under our observation, I will sketch it but briefly.

Comparing it with tuberculous meningitis, the onset is, as a rule, abrupt, with high fever and vomiting, and very often with a convulsion.

Delirium is more frequent and more marked, though stupor is common. More pain in the head and neck is evidenced and there is more injection of the conjunctivæ. The retraction of the head with stiffness of the muscles of the neck is practically always present. There is opisthotonus and a marked Kernig's sign. The pulse is rapid and usually regular. The temperature is high and rather sustained. A considerable percentage, which differs in different epidemics, show the petechial eruption that gave the name "spotted fever" to the disease.

The blood count shows a considerable leukocytosis, on an average higher than the tuberculous form, and a high polymorphonuclear percentage.

The most striking differences, then, are suddenness of onset, delirium, opisthotonus, Kernig's sign, high fever, eruption and high white cell count.

And yet, again and again, one meets such striking deviations from the type that only a lumbar puncture can settle its etiology and one wonders why such a simple procedure should ever be neglected. The fluid is increased, is under pressure, is turbid, sometimes running as thick as pus. It is loaded with white cells; the polymorphonuclears predominate, 80 to 98 per cent., and the organism of Weichselbaum, the diplococcus intracellularis meningitidis, or meningococcus is in evidence. The serum therapy is one of the glows of light upon the horizon of which I spoke. My personal experience with it is *nil*, but I am convinced that it will be a boon to humanity.

So far as our own epidemic is concerned, the introduction of the serum occurred at a time when the disease had begun to wane in numbers and severity, so that I think the comparative statistics before and after have a limited value. For instance, I find among my limited numbers three recoveries in infants under one year. You will remember what a dubious prognosis is granted these little ones. However, the use of the Flexner serum in fresh epidemics, as in Edinburgh and Belfast and in Ohio, certainly show striking results. Flexner reports 400 cases treated, with a mortality of 25 per cent. The mortality varies in different epidemics from nearly 50 per cent. to 90 per cent.

I come now to the third great class of meningitides, the sim-

ple suppurative cases, due to any of the pyogenic organisms, pneumococcus, streptococcus, staphylococcus, colon bacillus, typhoid bacillus, Pfeiffer's bacillus, and so on.

These constitute a very important group, and, as they are usually secondary processes, we may anticipate meeting such not infrequently. The picture closely simulates a cerebrospinal meningitis, as a few brief citations of such cases will show you.

The first occurred in an infant eight months old and always well up to the time of the onset, which was some twelve hours before admission to the hospital. It had vomited several times and then had a convulsion followed by stupor, which continued until death three days later. It showed beside the stupor, rigidity of the extremities, bulging fontanelle, pupils at first contracted and unequal, later dilated and not reacting to light, nystagmus, rigidity of neck, opisthotonus, Cheyne-Stokes respiration, tremor of extremities, rapid and weak, but regular pulse, Kernig's sign, increased knee-jerks, hyperesthesia. Twenty cc. of turbid fluid was obtained from the spinal canal, which showed in smears and cultures the pneumococcus.

As no autopsy was obtained we do not know to what this was secondary, but we suspect the ear.

The next case was clearly secondary to an ear involvement.

A little girl of nine had suffered two weeks from headache associated with earache. Then the pain suddenly left her, she vomited, went to bed, sank into a coma with stertorous breathing, had a convulsion, and was then brought to the hospital.

When admitted she was delirious, singing and muttering and picking at lips and nose. Lips, teeth and tongue were covered with sordes. She showed evidences of pain in the head, stiffness of the muscles of the neck, injected sclera, pupils did not react to light, Kernig's sign, loss of patellar reflex, temperature 102° F., going up to 105° F., white count 40,300, polymorphonuclears 91, lymphocytes 9.

Lumbar puncture recovered 60 cc. of semi-transparent, somewhat greenish, cloudy fluid under pressure.

Pathologist's report: Smear shows great numbers of Gram positive diplococci, chiefly intracellular, many lancet-shaped and bacillary forms. Transplant on ascitic agar failed to grow.

Diagnosis pneumococcus. Died in three days.

Right tympanum was found congested, red and bulging.

The next case, a pneumococcus meningitis, illustrates a curious series of events.

A boy of twelve years was struck by an automobile on February 9th of this year (1908), and was brought into Bellevue with a diagnosis of fracture of the base. He was unconscious six hours. He had a lacerated wound over the left eye. He did well and was discharged apparently cured on February 25th. On March 2d he complained of headache, backache and pain in the epigastrium. The next day he vomited everything he took and became delirious. He was worse the fourth and was brought into my ward March 5th.

The boy was irrational, talked incessantly, but would respond to questions put to him. He lay on his back with legs sharply drawn up. The pupils were unequal and reacted sluggishly to light.

The pulse was rapid and at times irregular. The abdomen was slightly scaphoid. There was slight opisthotonus, rigidity of neck and pain on handling, marked Kernig's sign and marked Babinsky's sign.

There was very decided hyperesthesia. He had a high temperature. Blood count 23,000; polymorphonuclears 72; lymphocytes 24; eosinophiles 4.

The canal was tapped and pus obtained so thick that only a few drops would come through the needle.

It showed the presence of pneumococcus. He died five days after admission.

Autopsy showed: Stellate scar on the left forehead. Convolutions flattened and vessels filled with blood. Over the right occipital lobe the cortex, pia and dura are adherent.

The cortex is lacerated and rusty red. At base, anterior arachnoid space, and pons arachnoid space distended with thick greenish pus, which extends down about the medulla. The fracture of base begins at left orbital plate just above supraorbital ridge, crossing inner plate, then crossing ethmoid plate and left wing of sphenoid, then through right middle fossa and across base of superior surface of petrous portion of temporal bone to jugular foramen. Right middle ear contains mucoid discharge with rusty red pigmentation of mastoid cells of bone directly under line of fracture. (Coroner's report.)

It would seem almost certain that the meningitis originated from infection coming through the line of fracture into ear.

I have among my cases one of streptococcus mucosus capsulatus, two of streptococcus pyogenes, and one of an undetermined organism.

As has been said, these symptoms, delirium, headache, retraction of neck and opisthotonus, Kernig's sign, ocular disturbances, rapid pulse, high fever and high white cell count all simulate cerebrospinal meningitis. The spinal fluid, too, microscopically, is hardly to be differentiated from that of cerebrospinal meningitis and only a bacteriological examination can determine its true nature.

In the absence of an epidemic, then, such a symptomatology is almost surely a suppurative meningitis and of correspondingly bad prognosis, unless belonging to one of the two groups to be next discussed and which I consider the most important part of our paper.

The fourth group of meningeal conditions to which I wish to call your attention includes those cases in which there are typical signs of a meningitis, but which upon examination of the spinal cord fluid or at autopsy fail to show a true meningitis other than a serous one which occurs in a certain per cent., and that probably a major per cent. For this group we need a name which will characterize the clinical syndrome, without connoting its pathology, and which will subserve a temporary use until we do know more about the pathology. The French writers have given to it the name "meningismus," or meningism, a term which seems to excite violent opposition in some quarters.

The German writers are inclined to place all these cases under the head of serous meningitis, but I believe there is sufficient evidence that many such cases will show no such changes.

I have been surprised, in my service, at the large number of these cases, and more and more appreciative of our dependence on the spinal cord puncture for the elucidation of the problem, which otherwise must wait upon the issue and entail upon us the long suspense in the absence of data for the forming of a prognosis.

One of the most common causes, in my experience, for the induction of this state of meningismus is the toxin of the pneumococcus.

I will cite you a few such instances.

A child of twenty-six months, up to that time in good health, was taken suddenly ill with vomiting and high fever, restlessness and irritability, and with rigidity and tremor of the extremities,

which continued for five days before she was brought into the hospital.

At that time my notes mention that she was stuporous, extremely hyperesthetic, lies with knees slightly drawn up, extremities showing fine tremors, respiration 58 and somewhat Cheyne-Stokes in character. Pulse rapid, regular and good volume. Conjunctivæ a little purulent, face flushing and paling, *tâche cerebrale*, rigidity of the muscles of the neck and Kernig's sign. The next day pupils were unequal and did not react to light. The temperature was 105°F. The blood count gave 60 per cent. polymorphonuclear cells and 18,000 whites. Now this occurred during the epidemic of cerebrospinal meningitis and the child gave a perfect picture of this affection.

A lumbar puncture was done and we obtained a clear fluid under pressure, amounting to 30 cc. on one occasion and 75 cc. on another. The pathologist reported no tubercle bacilli.

On the 30th, that is, on the eleventh day of her illness, she gave the first physical signs referable to her lungs, those of a lobar pneumonia confined to the middle lobe. Three days later the temperature was normal and the convalescence was soon established.

Every physician knows how common are striking cerebral symptoms in upper lobe pneumonias, but may overlook how closely it may resemble true meningitis.

The next case illustrates the onset of meningeal symptoms in the course of a lobar pneumonia that might be interpreted as a complicating pneumococcus meningitis.

To be brief, the child was taken ill three days before admission, February 19, 1909.

The symptoms were those of pneumonia and the lesion was found in the upper right lobe. The child was very sick and the resistance was poor, as the blood count bespoke. Whites 10,000; polymorphonuclears 70; lymphocytes 30. On the 24th the child was very irritable and hyperesthetic. There were tremors of the hands, stiffness of the muscles of the neck, some opisthotonus, *tâche cerebrale*, no Kernig's but a suggestion of a Babinsky sign on the right, pupils dilated and do not react to light, some strabismus, patellar reflexes increased and some spasticity of the muscles of the face. Lumbar puncture gave clear fluid with no cells in the field.

Here the importance of lumbar puncture is obvious; the differentiation from a true meningitis could not otherwise be made.

The next case is one of a meningismus of upper lobe pneumonia simulating in many respects a tuberculous meningitis.

A child of one year, whose mother was said to have tuberculosis, was taken ill ten days before admission with cough and fever, and admitted February 26, 1909. On admission the child was stuporous. The pupils were unequal, and reacted sluggishly to light. There was internal strabismus of the left eye. Both upper and lower extremities were semi-flexed and rigid, so that the child could be turned as one piece. The neck was stiff and there was a slight opisthotonus. There were tremors of the hand. The reflexes were increased, but there was no Kernig's sign.

This condition continued throughout the illness. The temperature was 105° F. and remained sustained. The blood count was 10,000.

The respiration was hurried and there was an occasional expiratory grunt.

The lungs were negative.

The respiration, grunt, rigidity, high temperature were against tuberculosis, but the history and other details were highly suggestive of it.

A lumbar puncture gave a clear fluid, not under much pressure, and reported by the pathologist as negative for tubercle bacilli, and sterile.

Wasserman's reaction negative.

On March 2d, the fifth day after admission, the lungs gave the first physical signs, frank consolidation of the upper right lobe.

The next day the child apparently defervesced, but soon after she seemed sicker, the temperature went up, irregular signs appeared over the bases, a laryngeal stridor appeared, a discharge from the nose followed, a culture was positive for the Klebs-Loeffler organism, and the child died.

Autopsy showed a lobar pneumonia of the right upper lobe, scattered lesions over the bases, but we were not allowed to examine the brain.

Another condition that gives rise to a considerable number of these cases of meningismus is gastroenteritis.

A case in point is the following:

A child of ten months was admitted to Bellevue October 31st. It had been on the breast up to six months, then on bottle feeding. It had apparently done well until two days before, when it began to have green stools, vomiting, fever, and a slight con-

vulsion. There were no physical signs on admission. Temperature was 104.2° F., and blood count 9,000; polymorphonuclears, 60; lymphocytes, 40.

On the third day after admission a nasal discharge and a laryngitis, suggestive of membranous croup, developed. Repeated cultures were negative, but antitoxin, 6,000 units, were given at once before return on culture. A vomiting persistent and severe became the main feature of the trouble. On November 4th, five days after admission, the following symptoms were noted:—

Deep stupor, upward rolling of the eyes, constant rocking of the head, slight rigidity of the neck, general irritability, well marked Kernig's sign of the right side. Slight muscular twitching. At nine in the afternoon all these symptoms had disappeared and no lumbar puncture was done.

Three days later the child suddenly went into collapse and died.

Autopsy showed thoracic and abdominal organs, including the stomach, especially interesting on account of the severe vomiting, negative. Brain on the left side showed marked congestion of the peripheral vessels with a marked serous exudate under the pia, involving only that side of the brain on the vertex.

Lateral ventricles and choroid plexus normal.

The brain tissue was abnormally wet or edematous and probably a transitory edema had given rise to the meningismus.

Another common affection that may give rise to the picture of meningitis, indeed, in some to a true meningitis, is influenza.

A child of eighteen months, admitted to the ward December 19, 1907, was taken abruptly ill with a temperature of 105° F. three days before. On admission was stuporous, hyperesthetic, showed retraction of the head, exaggerated reflexes, moderate Kernig's sign. Blood count, 6,700; polymorphonuclears, 72; lymphocytes, 25; eosinophiles, 3. Lungs negative.

Lumbar puncture gave 60 c.c. under pressure. Pathologist reports the specimen sterile. Four days after admission the temperature was normal. I might add that immediately after tapping the mental symptoms and signs of irritability cleared up. In this the tapping was a valuable therapeutic measure.

I will not attempt to differentiate between the fluids of the cases that might be deemed serous meningitis and those to which the term meningism might be more correctly applied, as connoting an irritation without inflammatory or vasomotor reaction.

The fluid often came out under considerable pressure, again not increased at all. In some cases the quantity was greatly increased, in others normal. It was always crystal clear.

The cells are said to be very slightly increased and predominatingly lymphocytic. The albumin content may be increased up to 0.1 per cent. These cultures are always negative.

There is one condition which, if it give symptoms at all, may closely simulate a meningitis. It occurs in children who are wretchedly reduced, giving rise to its symptoms in recurring attacks, is not accompanied by temperature, and is usually a post-mortem surprise. I speak of a pachymeningitis hemorrhagica interna.

The cord fluid will, in some instances, give a hint of the condition. I cite one such case. The diagnosis was made at the autopsy table.

A child of three and one-half months was admitted to the ward November 14, 1907, presenting the lamentable picture of emaciation and neglect so common in our service. The ear was discharging and the child looked like a case of meningitis or meningeal irritation, the most marked signs of which were the retraction of the head, stiff neck, Kernig's sign. The temperature, however, was normal and remained normal. The first spinal cord fluid contained some blood attributed to the puncture of a vein, but possibly due to the pachymeningitis. The second and third specimens were clear. This alternation of blood and clear fluid is due to the hemorrhages from the dura.

All specimens were reported sterile.

Autopsy Report.—Dura adherent. Internal surface of dura on both sides, as far down as the tentorium cerebelli, is covered by a thin reddish membrane. While the general character of the membrane is hemorrhagic, there are a few areas of diffuse yellowish pigmentation. Both middle ears are filled with a grayish-yellow purulent exudate. The spinal cord and its dura show no gross pathologic lesion. A large amount of fluid exudes on sawing through the skull. The pia is everywhere normal in appearance, not being opaque or granular. There is a considerable amount of fluid at the base, but no flattening of convolutions.

Posteriorly along the vertebræ there is considerable amount of bloody semigelatinous fluid. Elsewhere normal.

Diagnosis.—Pachymeningitis hemorrhagica interna chronica.

The next case illustrates a condition all too common, but in

this instance a neglect that in private practice would hardly obtain.

The child was an infant thirteen months old, admitted January 3, 1907. The parents were ignorant, spoke no English, and a history was elicited with difficulty.

It had had a cough for six weeks, vomiting and diarrhea had ensued, and a paralysis had developed which had not even been noticed by the parents.

It was a large, well-developed child, stuporous, with paralysis of the right arm and leg and left side of face, with inability to close left eye. The tongue deviated to the right as it lay in the mouth and the right side was flabby. The right side of the body was colder than the left. The pupils were unequal and did not react to light. On crying the face was drawn to the right.

The patellar reflexes were sluggish, the right leg had no tone, but showed a Kernig's sign; the left had no muscular tone and did not present a Kernig's sign. There was no retraction or stiffness of neck, the cervical glands were large and hard. The blood count showed 1,500 whites and 72 per cent. polymorphonuclears.

So far the case might have been a meningitis, but two other factors barred this out and made the diagnosis almost certain—namely, a clear spinal fluid and two discharging ears.

Shortly after there developed a hard indurated cord along the line of the jugular vein.

There was an otitis media, a sinus thrombosis and jugular thrombosis with abscess formation. The left seventh nerve was paralyzed in the canal or at the nucleus, while the abscess was probably in the posterior fossa impinging on the pyramidal tract before its decussation.

I am sure a valuable lesson can be drawn from the following case:—

A boy of nine was admitted to my ward December 20, 1907. Significant factors in his history were that another child of the family had died at the age of five of meningitis; that a month ago he had an earache lasting thirty-six hours, but without discharge, and that two weeks ago he had been hit on the top of the head and had not felt well since. Five days before admission he had come into the house complaining of severe frontal headache, which had increased to an unendurable intensity, the parents calling a physician three times in one day in quest of some relief.

Vomiting followed and has been kept up. There was loss of

appetite and very little sleep obtained for days. Bowels were constipated.

On the day before admission there was shooting pains behind both ears. His temperature was normal, his pulse slow (65) and regular. His abdomen was slightly retracted and a marked Kernig's sign was present.

Dr. McCoy examined his ears and found the drums normal.

Dr. Holden found the eye grounds normal. The urine was negative; the blood counts varied from 8,000 to 10,000; polymorphonuclear cells from 51 to 81.

Lumbar puncture gave 40 cc. of clear fluid reported as sterile, containing 120 cells per c.mm., 95 per cent. lymphocytes. No tubercle bacilli.

Headache and vomiting continued. On the 26th the pupils were somewhat contracted, the Kernig's sign was marked, the patellar reflexes lost, his gait uncertain, with tendency to fall to the left, pulse 52 to 56.

A Calmette was done and a very striking reaction followed.

The earache, blow upon the head, severe headache, vomiting, slow pulse, favored an abscess, and 81 per cent. of polymorphonuclear cells favored it.

The brother dying of meningitis, the striking Calmette reaction with the other symptoms favored a tuberculous tumor of the brain.

This boy had none of the stigmata of syphilis, and yet, in consideration of the protean manifestations of the disease, and as an only chance, he was put on the iodides, gr. xv. *t.i.d.*

The result was marvellous. Day by day the symptoms and pains disappeared. He put on three pounds in five days, and eleven days later left the ward a well boy.

One almost feels that in any apparently hopeless condition he should ask himself, May this not be syphilis after all?

The next report, the most important I have to offer you, introduces a class of cases, dire in their import, fatal or often worse than fatal, but for which the present gives a rich promise for the future; I refer to birth cerebral hemorrhages.*

On February 17th, of this year, 1908, I delivered a primipara of thirty-five years. The pregnancy had been uneventful. The labor was very slow and an almost complete inertia uteri prevailed.

* "A Case of Cerebral Hemorrhages with Operation," Meara and Taylor. See ARCHIVES OF PEDIATRICS, November, 1909.

At the end of forty-six hours the cervix was but three fingers dilated. I completed the dilation with bags and applied the instruments to a head engaged but high in the pelvis. The instrumentation lasted an hour and without help from anything that simulated a uterine contraction. The instruments were not taken off during this time, but often unlocked to relieve pressure. When the head was brought down on the perineum, the fetal heart was so weak that it became evident that either the fetus or the perineum must be sacrificed. The latter was chosen and a tear of the second degree sustained. The cord was once around the body and the child deeply asphyxiated. It was finally resuscitated and without the help of the violent measures often used, as the Dew method.

The child cried lustily and the color was ruddy.

There were superficial excoriations over the left ear and neck and the right eye. There were also extensive hematomata of both parietal regions.

Delivery at 3:30 P.M.

That evening the child showed a peripheral palsy of the left side, being unable to close the left eye and displaying a marked flattening of the left side of the face, and drawing of the mouth well to the right on crying.

The next morning the eye could be closed and the facial palsy was less marked, but the left arm was found very rigid and the foot sharply flexed dorsally. The knee-jerk was greatly exaggerated. That evening the condition of the left side was the same, and convulsive movements, especially of the upper part of the body, were manifested, with marked shrugging movements. The color was still good and the pulse strong. The child cried a good deal. The next morning the child looked badly and was cyanotic. There had been no frank convulsions.

It was decided to operate and the operation was performed by Dr. Alfred S. Taylor, of New York City.

Incision through the scalp along the edges of the right parietal bone turned out a hematoma. The parietal bone was turned down as a flap and a small subperiosteal hemorrhage found on the inner aspect. The dura was incised and there was found a thin clot of blood covering the greater part of the motor area and the region adjacent, which arose from a rupture of the veins at about the beginning of the sylvian fissure. This was removed by saline irrigation. Flaps were returned and wound closed. The child died an hour later.

The autopsy showed in addition that the middle and posterior fosse were filled with blood, the clotting of which about the medulla, held in the rigid space bounded above by the tentorium, had been the cause of death.

The importance of this case was, first, some data for the decision of when to operate and, second, the mode of death in delay.

This case might be called an early operation as compared with most of those on record. One has to face on the one hand possible death from pressure, or, worse yet, physical and mental impairment, but with a slight chance of absorption without organization; on the other, shock, possibly fatal, but with a chance of cure. In another instance so clearly defined I would not hesitate to choose the operation.

Here the color, vigor of the cry and quality of pulse in the first twenty-four to thirty-six hours gave promise of results, but in the next twelve hours the blood had found its way down to the base and involved the vital structures.

The lamentable results of these birth hemorrhages we are constantly seeing in our hospitals and clinics for children. I have two examples at Bellevue at the present time. The first case is a slight example, the true nature of which has been hitherto overlooked. The vast prognostic importance of such a case is at once evident.

This infant, ten months old, has the usual history. A difficult birth, instrumentation, asphyxia, convulsions for four days after birth. Then apparently well.

At four months, recurrence of convulsions, which have continued frequent since. A fixed, staring look often precedes the convulsion, and I find this brief staring, paling and breath-holding period sometimes the only expression of cortical irritation.

The examination showed a well developed baby, but with a head measurement of only $16\frac{1}{4}$ inches. Displaying an indifference to its surroundings unusual at that age, inability to sit up alone. A little awkwardness and stiffness of the muscles of the hand, suggesting athetosis, a curious spasmodic movement, in which the child invariably rolled to the left and flexed its whole body.

A convulsion occurred during the examination. It was tonic in character.

The main features in the slight cases are head measurements, small out of proportion to the other measurements, evidences of

mental retardation, delay in sitting up, walking, etc., staring spells or "fainting fits," as the mothers sometimes call them, and the history above detailed.

Now and then these cases may simulate a meningitis closely. For example, a child of ten months was brought into the ward without a history. He lay deeply stuporous, the pupils were sharply contracted and there was marked nystagmus. It was thought there were slight evidences of ptosis and facial paresis. The head was retracted and the muscles of the neck very stiff. The respiration was irregular with alternating dyspnea and apnea. The limbs were flexed and rigid. The Kernig's sign was excessive, the knee-jerks much exaggerated and there was a tâche cerebrale. The temperature was slightly elevated, there were râles all over the chest. The blood count was 12,700 and the polymorphonuclears 52 per cent. In so far this case looked like a tuberculous meningitis and was so thought to be by competent observers.

The facts militating against it were the degree of rigidity, as the child could be picked up by the shoulders and held out horizontally like a block of wood, the tendency to adductor spasm of the lower extremities, the degree of nystagmus, a foolish long drawn idiotic cry, a tendency to athetoid movements of the fingers, and a head measurement of 16½ inches. I felt certain that these were enough for a diagnosis of cerebral diplegia from birth hemorrhage.

The cord was tapped and only clear sterile fluid and no cells could be found on centrifugalization.

Later, through a Polish interpreter, we got the following history. Mother was in labor three days, instruments were then used and the child was born asphyxiated.

The child had been in the condition as described since birth.

The child was blind and showed one other symptom of spasm more marked than I have ever seen it before, namely, a pleurothotonus.

The last case I have to mention is a child who presented an extreme degree of opisthotonus, suggesting a chronic basilar meningitis.

The child came into the ward at the age of five weeks, on January 3d, of this year. She is still with us and the condition still obtains.

It was an emaciated, pale, feeble infant weighing a little over five pounds, cyanotic and with a hoarse cry. She had a suppurative

tive parotitis on the right side, which was later incised, and the staphylococcus pyogenes aureus recovered. On March 1st the condition shown in the photograph appeared. She has had no impairment of consciousness and seems as bright as babies of her age and condition of malnutrition usually are.

The head is markedly retracted, all the limbs are rigidly flexed, and opisthotonus is excessive.

She had 17,000 white cells and 44 per cent. of polymorphonuclear cells, and 56 per cent. of lymphocytes. The spinal cord fluid was normal. Her wretched nourishment, a large liver and hoarse cry suggested a syphilitic basilar meningitis.

She has, however, developed no other signs and her spinal cord fluid, subjected to a Wasserman reaction, gave a negative result.

She may belong to the group of cases described by Hochsinger, who show an exaggeration of the physiological hypertonia of the first few months of life before the upper and lower motor neurones come into physiological relationship. These conditions occur in any wasting diseases of the early months.

He characterized it as myotonia of the newborn and of nurslings. It is spoken of in the literature as Hochsinger's myotonia, an unfortunate designation, as it is readily confused with Thomsen's myotonia congenita and with Oppenheim's myatonia, very different disease pictures.* It is possible that this case might be included under tetany.

We have just been through an epidemic of anterior poliomyelitis and learned many new things. In the first place, that it is a disease that may give rise to many different nerve pictures.

It is creeping into the literature under the name of the Heine-Medin's Disease, and one of its manifestations is that of a meningitis. I know of one case that was diagnosed by a good man as a tuberculous meningitis and a fatal prognosis given.

The true nature came out with the clearing up of the meningeal picture and the appearance of a flaccid paralysis.

Another condition with which we are becoming more familiar, simulating in some instances a meningitis, is a bacillus coli infection originating in the bladder or kidney. I have seen such a case, running a long course and clearing up on discovery of the organism and administration of urotropin.

* The child was discharged well some months later.

A CASE OF INFLUENZA MENINGITIS.

BY LOUIS C. AGER, M.D.,

AND

O. T. AVERY, M.D.,

Hoagland Laboratory, Brooklyn, N. Y.

On October 28, 1909, C. S., male infant, six months, was brought to the Polhemus Clinic. He was an exceptionally well-developed, handsome child, breast-fed, weighing twenty-one pounds. I learned afterward that both he and a brother of three years helped support the family by sitting for their portraits a few hours every week. These photographs I was told are sold by photographers to manufacturers of cereals and patent foods.

The baby had never been sick before. He was brought to the clinic on account of a convulsion followed by slight fever on the previous day. On direct question the mother stated that there had been a slight cough for a few days.

Physical Examination.—Weight, twenty-one pounds. Skin soft and cool, no rash. Adipose tissue normal in amount and firmness. Muscles firm and well-developed. Head normal. Chest normal. Abdomen slightly tender everywhere; right rectus more resistant than left and tenderness apparently more marked in the right lower quadrant. On slight abdominal pressure both legs were sharply drawn up, giving the appearance of a reflex contraction rather than voluntary movement. Further examination brought out a slight rigidity and definite tenderness in the back of the neck. The pupils were normal and there was no definite indication of a Kernig or Babinsky sign. The temperature was 100.3°F.

The patient was not seen again till November 1st. At this time the condition pointed unmistakably to meningitis, head retracted, neck sensitive, slight opisthotonus, pupils sluggish and legs flexed and rigid. Temperature 103° F., pulse full and regular. The baby had had several convulsions each day and had vomited at times, but had retained most of its food, and the stools indicated good digestion.

About 40 c.c. of cerebrospinal fluid were withdrawn under slightly increased pressure. It was not discolored with blood and contained no flocculi, but it was decidedly cloudy. Part of this fluid was sent at once to the Rockefeller Institute and part was submitted to Dr. Avery, of the Hoagland Laboratory. The labora-

tory report appears later. 30 c.c. of Flexner serum were injected before the bacteriologic report was received. There was no reaction.

December 2d. Patient much worse; temperature from 103° to 105½° F.; many convulsions; some vomiting, although he nursed fairly well.

December 3d. Patient worse; comatose part of the time, with occasional convulsions. Temperature range as on the previous day. Heart at times very irregular.

December 4th. Condition about the same. There was very marked hydrocephalus and an attempt was made to relieve pressure by spinal puncture. No fluid came through the needle, and with suction by means of an aspirating syringe only a drop of thick granular white pus was obtained.

December 5th. The infant was much worse. There were alternating states of coma and convulsions. The heart and respirations were very irregular. The condition resembled in many ways the terminal stage of tuberculous meningitis, but the temperature remained high. Death occurred about midnight. Permission to open the skull at the home was obtained and the partial necropsy was made about 10 A.M. December 6th.

Autopsy December 6th, 10 A.M.

Male, six months, very large, well nourished, and well proportioned child. Brain and upper cord only examined. Calvarium very adherent over large areas. Dura intensely congested, and tense. Brain tissue bulged through when dura was cut. Membranes adherent to brain over small areas, adhesions easily broken. Brain tissue very friable. Ventricles so distended that the serum immediately broke through. Cortex from one-half to one-quarter of an inch thick. Two small areas of thick, yellow exudate over upper part of the motor area. A very slight amount of exudate at the base. Patches of exudate in the sinuses. Both frontal lobes covered on all sides with a thick tenacious green exudate from a sixteenth to an eighth of an inch thick. It was not adherent to the brain surface and did not penetrate into the fissures. It was especially thick below and was adherent to the dura at the base, suggesting the cribiform plate as the point of entry of the infection. The ears were normal.

The spinal canal was not opened, but as far as it could be examined from above it was filled with thick, milky pus, not at all the color of the green exudate above. It was thick enough to ac-

count for the failure to obtain any fluid at the last puncture. Smears and cultures were made by Dr. Avery, of the Hoagland Laboratory, from the exudate, from the fluid in the ventricles, and from the pus in the spinal canal.

BACTERIOLOGIC REPORT.

The first specimen of cerebrospinal fluid submitted for examination consisted of about 20 c.c. of a whitish turbid fluid. From this specimen smears and cultures were made directly without sedimentation. Stained by Gram's method these smears showed an abundance of leukocytes, chiefly of the polymorphonuclear variety, and numerous Gram-negative bacilli. The greater number of these organisms were extracellular, but a few were observed within the cell bodies. They stained feebly, and frequently with irregular polar staining, and appeared much larger than the usual influenza bacillus. Because of these morphologic variations a colon infection was at first suspected. After standing in the ice-box several hours the specimen showed an abundant, viscid and purulent sediment with water-clear supernatant fluid.

Cultures were attempted directly from the fresh specimen upon plain agar, Loeffler's blood serum and blood agar. Growth occurred only upon the last medium, and subsequent transplants were successful only upon hemoglobin-containing media. After twenty-four hours at 37°C. the original cultures on human blood agar showed a few discrete dewdrop-like colonies, which, upon staining, consisted of typical Gram-negative bacilli. Subcultures upon defibrinated rabbits' blood agar yielded a similar, but more luxuriant, growth.

These findings were confirmed four days later by smears and cultures of a small clot of blood and pus from the second lumbar puncture. Forty-eight hours later at autopsy pure cultures were obtained from the meningeal exudate. These all showed Gram-negative bacilli morphologically and culturally identical with those in the first specimen of spinal fluid.

A suspension in 3 c.c. of salt solution was prepared from the surface growth of three forty-eight hour blood agar cultures. Of this suspension 1 c.c. was injected intravenously into a rabbit, which had been bled from an ear vein three days previously. About 15 c.c. of blood had been withdrawn for use in the preparation of blood agar. This animal, whose resistance had been thus lowered, died within forty-eight hours after inoculation, without

evidence of any gross lesions at autopsy. The organism was recovered in pure culture from its heart's blood. Another c.c. of this suspension was injected intraperitoneally into a guinea pig, and the remainder inoculated postorbitally directly into the brain substance of a second guinea pig. Neither animal showed any evidence of disease. At the end of two weeks both animals were killed and at autopsy failed to show any lesions. Attempts to recover the organism culturally from these animals were unsuccessful in both cases.

From two specimens of spinal fluid and from the meninges postmortem an organism was recovered in pure culture, the characteristics of which compared to those distinctive of bacillus influenzae are as follows:—

(1) A Gram-negative bacillus, staining feebly, frequently showing polar staining, varying in size and often occurring in thread-like forms.

(2) Cultures of this bacillus were successful only on media containing hemoglobin, upon which it showed discrete, minute dewdrop-like colonies.

(3) Animal inoculation failed to produce any evidence of infection in normal guinea pigs.

Bibliography.—Considering the pandemic nature of influenza the number of cases of influenza meningitis reported is remarkably small. I am inclined to believe that the condition is more common than is generally supposed, as it can be differentiated from meningococcus infection by culture only.

Cohoe, in the *American Journal of Medical Sciences*, January, 1909, gives the bibliography to that date. He reports but 24 cases in which the bacteriologic findings were conclusive, and several others in which the Pfeiffer bacillus was supposed to be the infective agent.

Davis, in the *Archives of Internal Medicine*, October, 1909, reports 2 cases in a pair of twins who died on the ninth and eleventh days after birth.

Two or three other cases have been reported during the past three months.

Cohen (*Annals of the Pasteur Institute*, April, 1909) published a series of inoculation and culture studies in which he tried to prove that the organism found in the cases of "influenza meningitis" is not the Pfeiffer bacillus.

160 State Street.

PULMONARY ABSCESS FOLLOWING SEPTIC DEGLUTITION PNEUMONIA.*

BY S. SEILIKOVITCH, M.D.,

Pediatrist to the Mount Sinai Hospital of Philadelphia.

E. B., female, sixteen months old, was admitted to the Mount Sinai Hospital of Philadelphia November 23, 1909.

Father and mother of patient are both well. The mother had seven children and one miscarriage. One child died at the age of fifteen months from bronchopneumonia following measles; two other children had croupous pneumonia and recovered, and one child, five years old, was operated on for spinal and hip joint disease. The patient in question had measles in July, 1909, and recovered; two months later did not feel well on account of "supposed dentition," and developed aphthous stomatitis.

In about six weeks later, two weeks prior to admission to hospital, the mother noticed that the child had difficulty in nursing, which increased day after day until it embarrassed the child's respiration. Fever of some degree was present. On examination, it was found to have been due to postpharyngeal abscess, which was incised, relieving the child's distressing condition at once. The child was playful, and was doing well, when some days later suddenly she developed high fever with rapid respiration and painful cough. There was no vomiting, no chills. On the following day the child was admitted to the hospital.

Physical Examination.—Patient, female, sixteen months old, physically well developed for her age; the eyes are closed, there are constant contractions of the eyebrows; the pupils are equal in size and react sluggishly; a bright flush is present on the right cheek, the alae nasi are dilated, occasionally a short, dry, painful cough, the tongue moderately coated, the tonsils and pharynx in a normal state; the incision of the postpharyngeal abscess is healed, no membrane, pus cavity or any other discharge present.

The chest is well developed, respiration is rapid, and evidently labored and more limited upon the right side of the chest; tactile fremitus is increased on the same side; right and left side of the chest are equal.

Percussion reveals impairment of resonance over the right chest, chiefly posteriorly; on auscultation, harsh bronchovesicular breathing over the dull area, also some fine sibilant râles could be heard. The left lung is free from involvement. The heart is

* Read before the Philadelphia Pediatric Society, March 8, 1910.

normal, its sounds are weak and rapid, the pulmonary sounds slightly exaggerated, the abdomen soft and somewhat distended. Temperature is 102.1°F. A diagnosis of deglutition pneumonia was made, and the usual treatment instituted. The child appeared very ill, and the temperature took a septic curve. November 29th an injection of 5,000,000 of pneumobacterine was given, which resulted in bringing down the temperature from 103°F. to 99°F., but gradually it began to rise again until it reached, in two days, 103.3°F. in the morning, and dropped again in the evening to 98.1°F.

Leukocyte count is 40,400. Hemoglobin, 80 per cent. The contour of the right chest posteriorly and anteriorly by inspection did not differ from the left enough to arouse any suspicion of an empyema or pleural effusion, nor did auscultation or percussion give any clue to any focus responsible for the behaviour of the temperature or for the outcome of the disease.

Although on percussion a flat note was once elicited on a very limited area over the middle lobe of the right lung posteriorly, but, not being persistent, the use of the exploratory needle was not considered justifiable.

On December 6th, the temperature in the evening reached 103.1°F., with a pulse of 154, and respiration 32, and on the next day came down to 98.3°F.

Though weak, the child appeared very bright. The cough was more frequent than before; occasionally was of a choking character, and it was noticed that there was a considerable amount of a greenish yellow discharge of a very offensive, sickening odor evacuated from the throat. Dr. Arthur W. Watson made an examination of the throat, but no abscess, nor any evidence of discharge from any other part of the throat could be detected.

Evidently the drop of the temperature was due to, and the discharge came from, a localized focus of infection, which had ruptured and evacuated itself through the bronchus. The breath was nauseating. The child occasionally vomited a greenish yellow material, somewhat streaked with blood, and the offensive odor was perceptible from a distance. A microscopic examination of a smear from the throat and vomited matter revealed numerous streptococci, diplococci, and numerous pus cells.

Careful examination for tubercle bacilli was negative. On December 11th the temperature reached 102°F., and on examination a new focus of consolidation was detected at the apex of the

left lung posteriorly. Leukocyte count was 34,320. December 15th, Dr. J. P. Crozer Griffith was called in consultation. He agreed to the diagnosis, and did not suggest any change in the treatment, which was stimulating and supporting. The foot of the child's crib was occasionally elevated to favor the evacuation of the pus through the throat, and on the next day the child received an injection of 5,000,000 of streptococcus vaccine.

The temperature of 102°F. came down to 98°F., but climbed up again to the same level. The discharge from the throat was less, but not so offensive. The countenance of the child was much brighter, but, unfortunately, another complication set in—the child developed proctitis; great tenesmus, edema of the mucous membrane of the anus, and partial prolapse of the rectum, frequent small bowel movements, containing pus. Dr. A. Barlow, the resident physician, who made the microscopic examinations, examined the feces for tubercle bacilli, with a negative result. Among other germs, streptococci, diplococci, and colon bacilli were found. Another injection of 7,500,000 of streptococcus vaccine was given. The temperature of 102°F. came down to 98.1°F., and rose up to 101°F.

December 20th, 10,000,000 of the streptococcus vaccine was used, and December 23d a fourth injection was used, and discontinued, as the injections did not affect the disease materially.

The child looked very anemic, weak and exhausted. The feces were several times examined for tubercle bacilli, with negative results. The bowel movements were not as offensive as before, and fewer in number; tenesmus and prolapse of the rectum still were present at times. The general countenance of the child was anxious, indicating distress. The child was losing flesh and strength very rapidly; anemia was well marked.

Examination of the chest at this time yielded a tympanitic note over the middle lobe of the right lung posteriorly, higher in pitch when the child opened the mouth in movement of crying. There was also amphoric breathing and increased tactile fremitus—a condition undoubtedly indicating a cavity, the seat of the abscess.

December 28th, the thirty-seventh day of the disease, the child was extremely weak, the pulse wiry, rapid, impossible to count; the heart sounds weak, the child decidedly was losing ground. On the next day she died.

935 S. Third Street.

A CASE OF CEREBROSPINAL LUES.*

BY KAUFMAN SCHLIVEK, M.D.,

Attending Physician, Children's Department, German Poliklinik, New York City.

Joseph R., aged eleven years. Born, Roumania.

Family History.—Mother had eleven children and one miscarriage. This child was the ninth. The miscarriage was four years before his birth. She now has eight other children alive and healthy. One child died at four weeks; death was sudden; cause unknown. The other child died of measles. Father had ulcer on the penis when mother was pregnant with this child about four months. He was treated with mercurial ointment.

Previous History.—Normal labor. At four weeks he had what was probably a specific epiphysitis; it was treated with mercurial ointment. He developed normally, mentally and physically. Went to school at seven years, and was promoted in six months; since then he had not advanced.

Present illness began about three years ago, and the onset was gradual. Mother thought that the child did not understand so well. He became listless. Then he couldn't find his way home. She watched him through the window, and noticed that he ate food from the barrels. From the onset of the illness he complains of headaches and poor vision; the glasses improved his sight, but now he again doesn't see well. Always points to one spot on top of head as very painful. When he complained of severe headaches he vomited frequently. For the past two years he drops things very often. Since the beginning of the illness he doesn't walk well and must be assisted upstairs. Constipated. Urination normal.

Physical Examination.—General condition is good; he is well nourished. Expression is blank; he looks imbecilic, and his speech is not intelligent. He slurs his words. He is hypersensitive. Skull is tender to pressure and to percussion.

Eyes.—Left pupil is larger than right; they react readily to light. No paralysis. No nystagmus. "Fundi are normal" (Dr. Price).

Mouth.—Tongue protrudes to the right. Teeth normal.

Face.—Left facial nerve is weak.

Glands.—No enlargement. No epitrochlears.

Heart and lungs are negative.

Abdomen.—Liver felt just below the free border of ribs. Spleen not felt.

* Presented at New York Academy of Medicine (Section on Pediatrics), March 10, 1910.

Extremities.—Hands and feet are cold and deeply cyanosed. The skin over the dorsum of the second phalanx of middle, ring and small fingers is infiltrated. There is double pes planus. The gait is slightly spastic and waddling. Grip in both hands is poor. No ataxia.

Superficial reflexes are present.

Reflexes in upper extremities are exaggerated. Knee-jerks are markedly exaggerated. Double ankle clonus. No Babinsky.

Sensations of touch, temperature and pain not impaired.

January 8, 1910. "Wasserman and Noguchi tests are strongly positive" (Dr. Kaliski, of Mount Sinai Hospital).

Last week he had a transitory paralysis; he could not use the right arm and leg for three days. Now he drags the right leg slightly, and the grip in right hand is very weak. Since this attack there is difficulty in urination.

Without the serum test the diagnosis would be uncertain.

The prognosis is bad, for, first, the lesion is most probably a sclerosis, and, second, he has not responded to treatment. He had twenty inunctions of mercury, then large doses of iodides, and now he is getting both mercury and iodides.

In all cases of disseminate involvement of the nervous system we should suspect lues.

The serum test in these cases is of great diagnostic aid.

USE OF STERILIZED LINEN IN NURSLINGS.—Edmund Weill (*Lyon Médical*) has demonstrated that sterilized linen used for dressing infants is a preventive, as well as a curative measure, in the skin suppurations of infants. In an old hospital connected with the University of Lyons there were many cases of pemphigus and pyodermitis, the buildings being permanently infected by long use with pus microorganisms. Almost all of the children who came there suffered from these skin affections. The author now has all the linen sterilized in bags, in which it is kept until it is to be used for dressing the children. The clothing that has been only washed shows by cultures plenty of colonies of streptococcus and staphylococcus, while the sterilized clothing gives none at all. He recommends the sterilization of all clothing to be used in infants' hospitals. Even when a child has become infected, he says, the use of sterilized linen will promptly cure him.—*Medical Record*.

SOCIETY REPORTS.

THE NEW YORK ACADEMY OF MEDICINE.—SECTION ON PEDIATRICS.

Stated Meeting, Held March 10, 1910.

DR. ELI LONG, CHAIRMAN.

A CASE OF SALAAM CONVULSIONS.

DR. SIGMUND ARTHUR AGATSON presented this case. (The report of this case has been published. See Vol. xxvi., page 783.)

A CASE OF TETANY IN A CHILD ELEVEN MONTHS OLD.

DR. WILLIAM SHANNON presented this case, in which, besides the usual signs of tetany, there was present opisthotonus due to involvement of the muscles of the back in the tetanic contraction.

A CASE OF CEREBROSPINAL SYPHILIS.

DR. KAUFMAN SCHLIVEK presented this case. (See page 291.)

GNOCOCCUS VULVOVAGINITIS IN CHILDREN WITH RESULTS OF VACCINE TREATMENT IN OUTDOOR PATIENTS.

DR. B. WALLACE HAMILTON read this paper. A careful record had been kept of all the cases referred to the Vanderbilt Clinic during the past three years, the number of proven gonococcus origin being 344. The average age of these children was 5.1 years; the youngest was three weeks, the oldest twelve years and a half. There were 151 cases under the age of five years, the remaining 193 cases being over five years. The results of treatment were as follows: There were 260 cases treated by irrigation; 158 were cured, 53 not cured, 49 were lost, a percentage of 60. There were 84 cases treated by vaccines; 76 were cured, 5 not cured, 3 lost, a percentage of 90. The average length of time the patients were under treatment by the irrigation method, 260 cases, was 10.1 months; by the vaccine method, 84 cases, 1.7 months. In conclusion, Dr. Hamilton said that vaccine therapy had a place in

the treatment of this infection in little children for the following reasons: (1) The short time required for a cure in over 85 per cent. of the cases. (2) The ease of administration of the vaccine; no special apparatus or knowledge of technique being necessary. (3) The vaccine was apparently harmless when used under aseptic precautions. (4) It was not necessary to take the opsonic index, with its complicated technique. (5) It eliminated irrigations which directed the child's attention to its genitals, at times encouraging precocious masturbation. The frequent douches necessary in the irrigation treatment would, with the best care and gentleness, produce some injury when continued over a long period of time.

DR. GODFREY R. PISEK congratulated Dr. Hamilton upon his paper and the results he had recorded. Vulvovaginitis in infancy and childhood was such a bugbear to those who did much work in the hospitals that they were glad to have such a paper showing the results, especially consecutive results, because heretofore their time had been almost wasted in the treatment of these cases. Dr. Pisek said he had used vaccines in the treatment of vulvovaginitis, and that he had probably used all the irrigation treatments mentioned, and a few others besides, with no success in the great majority of the cases. He never felt that any of the cases were absolutely cured; he felt that after months or years he could take smears and again find the gonococcus, and this held good even in those instances where the child was discharged as cured, basing this statement on the smears made. He recalled a serious case of pelvic peritonitis in a child which did very well with treatment with a stock vaccine. He had lately attempted treating vulvovaginitis by making an autogenous vaccine with the hope of getting better results, but as yet he could not report on these. Cures in these cases should not be recorded until the patients were examined one or two years after treatment. Previous to the vaccine treatment he had used suppositories of 25 per cent. argyrol, having them made large enough to distend the vaginal mucosa. In this way he found that he could at least control the discharge. At the same time he wished to repeat he felt that he had not been able to absolutely cure these patients.

Every girl who enters the hospital has a smear made before admission, as well as subsequently. In the way of prophylaxis, the argyrol ointment and suppositories have been used as an experi-

ment, even if there was no discharge. Such children invariably went through the hospital without becoming contaminated. It was a terrible thought to feel that children in the hospital were being exposed to such a contamination, in spite of the fact that they were all treated with all the precautions they had been able to devise for their protection. With regard to the amount of vaccine used, he had employed in children as much as five million dead bacteria at a dose and had never seen any bad results from such a large dosage.

DR. L. E. LA FÉTRA said he had seen most of these cases and could confirm what Dr. Hamilton had stated in regard to the satisfactory results obtained from the vaccine treatment. For several years he had had at the Vanderbilt Clinic a special class for the treatment of vulvovaginitis patients. This class was for two years attended by the late Dr. Trenwith and for the past three years by Dr. Hamilton. For three years, all forms of irrigation treatment had been employed, and finally Dr. Hamilton resorted to the vaccine treatment for the first time in dispensary patients, and with extremely satisfactory results. Although there were many persistent and obstinate cases, about 80 per cent. appeared to be cured. This treatment offers a new hope for these patients who heretofore have proved a trying accumulation for any clinic.

ON PRELIMINARY EXAMINATION OF CHILDREN AT THE DISPENSARY,
AS A MEANS OF PROTECTION AGAINST CONTAGIOUS DISEASES.

DR. SARA WELT-KAKELS read this paper. Being impressed with the inadequate measures taken for the protection against contagious diseases, in 1907 she addressed a communication to the dispensary committee of the Mount Sinai Hospital, suggesting the introduction of a preliminary examination of the children applying for treatment, with a view of early detection and exclusion of the contagious cases. Her recommendations were accepted by the committee and referred to Dr. S. S. Goldwater, the superintendent, with power to act. The necessity for such prophylaxis was evident when they considered the large number of children applying at this institution. During the year 1908, 12,214 children were treated in the medical classes, while the consultations numbered 21,316. From December, 1908, to July 20, 1909, the number of consultations in the children's department amounted to 14,583. The daily average of consultations for both children and adults

was 678.11. Children are attended daily at 2 P.M., and at one morning class. The total daily attendance of children at the Mount Sinai Dispensary is about 150. Since April, 1907, preliminary examination of children applying for admission has been conducted in the afternoon service. The result is that contagious cases are excluded immediately on entering the dispensary, before being permitted to mingle with other applicants in the common waiting room. The method employed is that as the mothers and babies enter the dispensary at the main entrance an orderly stationed at the door directs them to a spacious and light recess to the right, where the physician is stationed. To avoid crowding if the attendance be large, and to avert possible infection, visitors approach through a winding passageway between two railguards, in single file. They are examined hastily for the presence of any infectious disease. The time for entering the dispensary to the conclusion of the preliminary examination of each applicant did not take more than from three to five minutes. It would be erroneous to assume that, no matter how perfect the system, infectious diseases would be wholly barred from the waiting room of the dispensary, but the danger would be considerably lessened. Another advantage of preliminary examination is the detection of conditions demanding immediate treatment, as, for instance, retropharyngeal abscess had been detected a number of times during the preliminary examination. The hospital records showing the number of cases of infectious diseases detected and excluded are proof of the need of this method. Only when the patients were found to be free from contagious diseases were cards marked O. K. given them, which had to be presented to the dispensary clerk before cards were issued to the various departments. The time the patient may remain in the dispensary may average from two to three hours and possibly longer. If the child is found to have a contagious disease, it is hurried off to an isolation room in the basement, where it may receive the necessary attention, and, in case of suspected diphtheria, an antitoxin injection; otherwise they are sent home, if within walking distance. If they cannot walk the Health Department sends an ambulance to take them home, or to a contagious hospital. This often took several hours and the mother and child would escape if not closely watched. A better plan was in operation in some of the European cities. Children excluded from the dispensary were sent to the observa-

tion ward. This was an achievement of recent years. It served to protect the individual from diagnostic errors. One part of the observation ward, set aside for the examination of patients and directly accessible from the dispensary, consisted of separate cells, which were disinfected after each patient. There was also a room for microscopic examinations, and children affected with contagious diseases were sent to pavilions for infectious diseases, while indeterminate cases were kept in the observation ward proper. This method had its prototype in the "systeme cellulaire" applied in the Hospital de l'institut Pasteur, where the cells were constructed entirely of glass and iron. In the year 1905 there were 869,866 persons treated in the dispensaries in Manhattan, and the number of treatments came to 2,452,814. As Manhattan had a population of 2,112,380, it would appear that in the year 1905 about two out of five inhabitants received medical aid in the dispensaries. This ratio varied slightly from year to year, but the fact remained that they were concerned with the welfare of thousands of the sick poor and were bound to assume greater responsibility. Great progress had been made in hygienic measures in the last ten years in dispensaries, and it seemed strange that no attempts had been made to restrict the spread of infectious diseases in waiting rooms. Professor Escherich was much impressed by the prevalent lack of prophylaxis, as was borne out when he made the remark that the fear of contracting infectious diseases must be much less in our country than it was in his own, as he had found in our dispensaries no prophylactic measures whatsoever. He did not hesitate to assert that our dispensaries, conducted as many of them were, might to even a greater extent than the public schools aid in the spread of infectious diseases. These conditions should be remedied, both on account of the welfare of the patient and on the ground of public policy.

DR. GODFREY R. PISEK seconded all that Dr. Welt-Kakels had said in her paper, and said that every precaution should be taken to prevent the spread of infectious diseases in our dispensaries. It was very difficult, however, to exclude such diseases as scarlet fever, especially in the early stages, by merely a cursory examination. Most of the dispensaries had common drinking cups, and this practice should also be condemned.

DR. F. L. WACHENHEIM said that the dispensary staff was very thankful for the procedure Dr. Welt-Kakels had presented

and which had been adopted. There were some details, however, which she had not time to go into sufficiently. The examination of the throats of all the children was very careful, especially were they on the lookout for Koplik's spots; if a child had any redness in the throat the chest was exposed and examined. These examinations were made by the house staff of the hospital. The spread of pertussis could not be stopped in the dispensary. It seemed strange to him that more dispensaries had not adopted such a plan as was now in vogue at Mount Sinai Dispensary.

HELMINTHIASIS IN CHILDREN.

DR. OSCAR M. SCHLOSS presented a summary of his investigations undertaken to determine the following: (1) The frequency with which intestinal worms were harbored by children between two and twelve years of age; (2) the species of parasite harbored and the relative frequency of their occurrence; (3) the number of cases in which the common intestinal worms were responsible for symptoms, and the nature of the symptoms produced; (4) the occurrence and significance of eosinophilia in infections with the common intestinal worms. Three hundred and ten children were examined; for purposes of convenience they had been divided into two groups, one of thirty, the other of 280.

The first group were made up entirely on the basis of suspicious symptoms, were in no way consecutive and, therefore, were of little statistical importance. These children suffered from obscure gastrointestinal symptoms or nervous disorders, which were not explained by the ordinary history or routine physical examination. This group also included 4 cases in which the parasites had been seen prior to admission. Twelve of this group of thirty harbored intestinal worms.

The second group of examinations were made as nearly consecutive as possible, without reference to the presence or absence of symptoms, and 80, or 28.57 per cent. of the children harbored intestinal worms. There were 31 cases of infection with the whip worm without symptoms.

In the case of other parasites the most common nervous symptoms were restlessness at night, night cries and general irritability. The gastrointestinal symptoms varied with the parasite. Abdominal pain was frequent in the case of thread worm and the dwarf tapeworm; pain in the lower abdomen or the right iliac

fossa was common in the thread worm infections, while with the tapeworm the pain was usually epigastric. Diarrhea was a symptom in only 2 cases, both infected with the dwarf tapeworm. Constipation was frequent in the thread worm infections. The symptoms produced by the common intestinal worms were usually mild in character. In the cases which presented symptoms due to helminthiasis the eosinophile cells were usually above 6 per cent., with the exception of the long standing infections. In the cases without symptoms eosinophilia was absent. The percentages of the eosinophile cells showed great variations and ranged from 6 to 33 per cent. The diagnosis of intestinal worms could not be accurately based on symptoms of physical examinations. The only satisfactory means of diagnosis is the detection of the parasite in the stools.

DR. GODFREY R. PISEK asked in regard to the nationalities of most of the cases, and what relationship the parasites bore to the food ingested; also for what data he had in regard to contact of the infected children with domesticated animals. The cases always had an albumen loss, eventually producing anemia; also the parasites can act as foreign bodies, often invading the appendix, or they may be vomited from the stomach. They produced a toxin, which no doubt accounted for very many of the reflex symptoms. Any of these conditions may result from the presence of these parasites.

DR. O. M. SCHLOSS, in answer to Dr. Pisek's question, said that there were no more than ten or fifteen of foreign birth among the cases he reported, although about one-quarter of them were of foreign parentage. With regard to the feeding, it was well known that one parasite at least, the common tapeworm, *tænia saginata*, was transmitted by the so-called "measley beef." An infected water supply might be the means, however, of the spread of other parasites. He said he had not examined the domesticated animals for the parasites. The *tænia elliptica* of cats had not been found in any of the children examined. In the case of the dwarf tapeworm he had found a parasite in a rat from one of the houses in which infected patients lived. A number of mice were examined, but did not harbor the dwarf tapeworm. The most common means for the transmission of the common intestinal worms is through the ova passed in the feces of infected patients.

CEREBROSPINAL MENINGITIS IN AN INFANT TWO MONTHS OLD.

DIAGNOSIS MADE BY TAPPING THE LATERAL VENTRICLES.

TREATMENT BY INTRAVENTRICULAR INJECTIONS OF
FLEXNER'S ANTIMENINGITIS SERUM. RECOVERY.

DR. LOUIS FISCHER reported the following case of an infant, whose condition was considered to be hopeless for three weeks, who made a brilliant recovery without any complications after being treated by the intraventricular injection of Flexner's serum. Until three days before her admission to the hospital she had never been sick. On September 29th she vomited, had anorexia, and gastric discomfort; a laxative relieved her of these symptoms. On October 1st the mother noticed twitchings of the arms, stiffening of the muscles of the neck, rolling of the eyeballs, restlessness, insomnia, and sudden piercing cry, as though the child was in pain. On October 2d the child was admitted to the hospital. There was complete rigidity of the body for ten minutes, then a relaxation. The eyeballs rolled upward, the neck, arms and legs were rigid, and the infant cried. During one of these spasmodic attacks the mouth remained wide open. There were no cardiac or pulmonary symptoms. The following were the chief complaints: Sudden onset with vomiting; loss of appetite in an otherwise normal breast-fed infant; rigidity of the head and neck; rigidity of the extremities and convulsive movements; anterior fontanelle was open one-half an inch, and was slightly bulging; the posterior fontanelle was closed; pupils were equal and reacted sluggishly to accommodation and to light.

On October 2d a lumbar puncture was performed and 1 c.c. of a turbid blood-tinged fluid withdrawn; the meningococcus was looked for but not found. On October 7th, 10th and 18th lumbar punctures were made, but resulted in dry taps. As they had had three successive dry tapings and symptoms of rigidity, opisthotonus, fever and twitchings, on October 20th the lateral ventricles were tapped and about 15 c.c. of turbid fluid-containing pus were withdrawn. From the right lateral ventricle the smears showed intracellular Gram-negative meningococci; cultures made from this pus at the Rockefeller Institute corroborated the diagnosis. The ventricles were irrigated with normal saline solution, at a temperature of about 105° F. The excess fluid was allowed to drain out through the needle, and 25 c.c. of antimeningitic serum were slowly injected into the ventricles. During the injection of the fluid the child changed in color from a waxy pallor to a uniform

red flush all over the body. One-half an hour after the injection of the serum the child still remained flushed, perspired freely, and had some frothing at the mouth. Otherwise the general condition was good. The temperature was 101.8°F., the respirations 80, and the pulse rate was 120. On October 21st the ventricles were again irrigated with normal salt solution and the serum again injected. The fluid withdrawn contained numerous meningococci. On October 22d the condition of the child was very poor. Opisthotonus was marked; the arms were rigidly extended and the palms everted. The child made no sound. Upon the slightest disturbance the child went into a spasm of muscular contraction involving all the limbs. The pulse increased to 140, but was regular, of good tension, of fair size and of good volume. On October 23d a dry tap was made in the fourth lumbar interspace; a second needle was then inserted in the third interspace, the first needle remaining *in situ*. Through the second needle 15 c.c. of Flexner's serum were injected, about 3 c.c. of which returned through the first needle. Then 15 c.c. of the serum were injected through the first needle and about 5 c.c. of this returned through the second needle, thus proving that both needles were in the canal and that there was a clear passage from one needle to the other. The child retained in the canal 20 or 25 c.c. of the serum. On October 25th slightly cloudy fluid was withdrawn, which appeared as though it had been colored by the serum injected. Up to October 28th the amount of serum injected was about 100 c.c. From this time on, to December 6th, there appeared to be a gradual improvement. This child was brought to the hospital October 2d, and was discharged December 16th, in normal condition. There were no evidences of blindness or deafness. The quantity of serum injected should equal, but never exceed, the quantity drained from the spinal canal. The success in Dr. Fischer's case was due to persistence in the method outlined, the removal of a sufficient quantity of the purulent fluid within the brain, and then the injection of the serum.

DR. SIMON FLEXNER said that the case presented by Dr. Fischer was the first example of recovery in epidemic cerebrospinal meningitis to come to his knowledge in which there was an impassable obstruction at the foramen of Majendie and in which a purulent exudate was proven to be present in the ventricles. The recovery in this instance was attributed to the use of the antimeningococcus serum, and he thought it was fair to attribute the recovery to it.

While they were all glad to accept the case as proof that recovery did follow the administration of the serum, yet it is not impossible that the washing out of the ventricles may have contributed to the favorable result. There had been several instances recorded in which the ventricles have been tapped and serum injected, but Dr. Fischer's case was the first one that terminated in complete recovery. Dr. Cushing had a case that died; Dr. Knox, of Baltimore, had a case that also died; and Dr. Netter, of Paris, reported another case, and this patient died. A very striking thing was that such a considerable operation could be carried out in these young children, and without any danger, so far as he knew, from the half a dozen cases recorded. There had been no ill results from the intraventricular injections. It was very hopeful, therefore, to see such a splendid recovery and to think that possibly some of the cases of obstruction which formerly terminated fatally might now be saved. One could speculate on how the communication between the ventricles and subdural space was re-established, and conclude that the foramen of Majendie became again patent. It was also possible that the foramina of Luschka contributed to the re-establishment of communication, but, for the present, this was merely speculation. Perhaps at some time an opportunity would be presented to make observations that would clear the point up.

DR. ALFRED N. STROUSE said what rendered Dr. Fischer's case of especial interest to him was the presence of an amblyopia, which was unassociated with any perceptible changes in the media and fundus. Careful and repeated examinations failed to disclose the slightest evidence of edema or swelling of the nerve, or retinal congestion. In fact the examination was entirely negative.

Such cases are evidently somewhat rare, for little mention is made of them in the literature, although it has only been in recent years that routine examinations with the ophthalmoscope have been practised in cerebrospinal meningitis.

He was inclined to account for the amblyopia on the theory of a toxemia. It is quite conceivable that toxins produced by the meningococcus might cause a temporary paralysis of the visual functions, and that, as in this case, a complete restoration of sight takes place as the toxins are gradually eliminated. Analogous conditions obtain in other forms of amblyopia and amaurosis, in which ocular changes may be slight or even absent.

DR. SAMUEL J. KOPETZKY said that the question of intraven-

tricular puncture interested him very much, and in otitic meningitis he had performed intraventricular puncture with a resulting cure. But his mode of procedure was not as Dr. Fischer's or Kocher's, for he perforated the ventricle through the tegmen cellulas of the mastoid process. When the ventricle was distended with fluid it was easily reached and could hardly be missed. He used the ordinary Quincke needle that was employed in lumbar puncture, pushing it through in a slanting direction for from 4 to 6 cm. He presented, at the Otological Section, two years ago, a patient who had recovered, in whom various and repeated examinations had not shown meningococcus, except at one of the examinations. All the other examinations had revealed different microorganisms than the meningococcus, and the case was not considered to be one of cerebrospinal meningitis, but to be a purulent meningitis following mastoid involvement. Tapping the ventricle through the fontanelle could be done in an infant, as in the case before the section; but in older patients with meningitis, from whatever source, the ventricle could be tapped through either of the other routes indicated, and the required amount of fluid withdrawn, and quicker results would be obtained than if an attempt was made to obtain the fluid through the spinal column. The advantage of the ventricular puncture in the cases which gave "dry" taps from the spinal column was so obvious as hardly to need comment.

DR. LOUIS FISCHER, closing the discussion, said that the case he presented was not the first one in which he had employed intraventricular injections. Another case, an infant seven weeks old, the one referred to by Dr. Flexner, was admitted to the hospital with symptoms of cerebrospinal meningitis. After a series of lumbar punctures resulting in dry taps, the ventricles were punctured, and pus containing the meningococcus was found. The ventricles were then irrigated with normal saline solution, and Flexner's antimeningitis serum was injected. The patient lived thirty-six days and seemed to show renewed strength after each serum injection. Dr. Fischer reported this case before the International Medical Congress last summer. These two patients were very young, one two months old, the other seven weeks old, hence it was possible, because of the open fontanelle, to utilize the same for diagnosis, and second for the treatment.

The bulging fontanelle suggested intracranial pressure, probably due to the ventricles being filled with pus. When this pus

was aspirated and the diagnosis confirmed, the serum treatment was commenced. Heretofore all infants under one year have died, and because of this fact he selected the youngest class of cases, believing that we could enter the ventricles from above and inject serum, in addition to the intraspinal route heretofore used for tapping and injecting.

With regard to the closure of the foramen of Majendie, Dr. Fischer thought it best to leave the child alone for sometime in order that it might become stronger, yet he wished to make a lumbar puncture in order to satisfy himself that the communication between the spinal canal and the subarachnoid space was open through this foramen.

When dry taps are noted, after entering several interspaces at different times, and if meningeal symptoms plus the bulging fontanelle continue, then and then only is one justified in tapping the ventricles; if in an infant, through the open fontanelle; if, on the other hand, the fontanelle is closed, then the Kocher method of entering the skull should be chosen.

ETIOLOGY OF WHOOPING-COUGH.—Klimenko (*Centralbl. f. Bakt. u. Parasitenk*) concludes: First, that the Bordet-Gengou bacillus is without doubt the exciter of whooping-cough; second, that one may experimentally produce whooping-cough in young dogs and monkeys, and probably also in other animals, by the injection of pure cultures of this organism; third, that he could culturally demonstrate the bacillus in all fresh cases and in the old cases found the organisms in the expectorated material. A minute description of the morphology and cultural characteristics is given. His experiments upon guinea pigs, rabbits, mice, lambs and little pigs were practically without results; on the other hand, he often succeeded in infecting monkeys by the inoculation of pure cultures of this bacillus, producing an infectious catarrh of the respiratory tract, this infection being often spontaneously carried over to other animals. The same results followed experiments upon young dogs, but older animals showed much greater resistance with correspondingly negative results. The clinical symptoms of the experimentally produced infections showed striking resemblance (including the wheezy cough) to those symptoms present in spontaneous whooping-cough of man.—*Charlotte Medical Journal*.

THE PHILADELPHIA PEDIATRIC SOCIETY.

Stated Meeting, March 8, 1910.

CHARLES A. FIFE, M.D., PRESIDENT.

MYATONIA CONGENITA.

DR. J. P. CROZER GRIFFITH showed this case, a boy aged seventeen months.

DR. W. G. SPILLER said that this is a very typical case in many respects. The upper limbs conform more to Oppenheim's description than do the lower. He suggested that an X-ray photograph of the hip joints should be taken, as the lower limbs are not very hypotonic and cannot be bent as much as is usual in this disease. He would not be surprised if some congenital hip joint disease were present. This is the third case reported in America, *i.e.*, the third case that occurred in this country. In the few cases in which an autopsy was obtained the muscles were found abnormal. The nervous system in his own case showed no changes. There was no diminution in the number of nerve cells in the anterior horns. The disease is at least muscular. The diagnosis is not difficult, as can be seen from this case. Poliomyelitis is easily differentiated from it; muscular dystrophy has some resemblance. The Werdnig-Hoffmann type of muscular atrophy has also some resemblance, but it is so rare that it need not be considered. The name myatonia is a poor one, as it is continually confused with myotonia.

MOLLUSCUM CONTAGIOSUM.

DR. FRANK CROZER KNOWLES reported 10 family epidemics and 41 cases in children. Two or more cases occurred in each family. Dr. Knowles referred to family epidemics reported up to the present time, and analyzed his 41 cases in children, age, sex, location and number of lesions being described. In one child there were 50, in another 100 lesions. He referred to other cases in which large numbers of lesions were mentioned; also to cases occurring in various animals. Dr. Knowles concluded that, in reviewing the literature on this subject, and including his own

cases, there seems little doubt that the disease is contagious. In approximately 25 per cent. of the patients a history of contagion can be elicited in the direct family, the household or intimate friends. Children are more susceptible to the disease than are adults. In a great majority of the cases the face is attacked, especially in the vicinity of the eyelids, either alone or in combination with other portions of the body. Most cases have but a few lesions. In those cases in which there are a large number of mollusca, the trunk and extremities are the areas usually attacked, frequently exclusive of the face.

DR. M. B. HARTZELL said that, as has long been known, molluscum contagiosum is much more common in children than in adults. But it is not a disease of childhood alone. Some men still deny that it is really contagious; but the weight of medical opinion agrees upon its contagious character. Diagnosis is usually not difficult, though errors may arise, especially when the lesions are very large. Rarely the lesions may reach a very large size, in one case being as large as two fists. The pathology is interesting, as the lesion is a typical benign epithelial neoplasm due to an infection. The cause of infection, however, is still unknown, although there is a probability that the so-called molluscum bodies may be parasites.

In answer to Dr. Repplier, Dr. Knowles said that seven men had successfully inoculated these tumors, Pick being the most successful, nine out of twelve inoculations succeeding. Attempts had been made to inoculate this disease in two instances, one being partially successful. Dr. Knowles said that the treatment of this disease consisted in destroying the growths by applications of undiluted carbolic or trichloracetic acid.

VINCENT'S ANGINA DURING QUARANTINE FOR DIPHTHERIA.

DR. FREDERICK FRALEY said that, while ulceromembranous angina had been recognized for a long time, it was not clearly differentiated from other similar conditions until Vincent, in 1898, showed the causative factor to be a fusiform bacillus associated with a spirillum, constantly found in smears taken from cases of this disease, which had formerly generally been mistaken for diphtheria. The cases which he reported occurred in an institution which receives children taken from the worst possible hygienic surroundings. At the time of the outbreak this institution

was under quarantine from diphtheria, introduced by a chronic nasal infection. The fact that the remaining children had been immunized was of assistance in detecting the new epidemic. The diagnosis was based on the absence of fever, prostration and discomfort; the presence of ulceration or exudation, peculiar fetid odor, characteristic spongy gums, which bled readily; confirmed by finding fusiform bacilli and spirilli in smears. In all there were 9 cases, 6 boys and 3 girls, ranging from three to fifteen years in age. The mode of transmission was probably through a drinking glass, to which all children had access. All children affected were promptly isolated, but it was not until this glass was removed that new cases failed to develop. From the statistics of the Philadelphia Municipal Hospital it appears that Vincent's angina occurs in about 1 per cent., but that of this number nearly all are secondary to some other infection; and in secondary Vincent's a fatal termination is very frequent. Primary Vincent's, on the other hand, gives a very favorable prognosis and is usually mild, although the writer has been informed of 2 cases which resulted fatally. The small epidemic reported was of interest from the fact that recent diphtheria had occurred in the institution, from the fact that transmission was probably through a mediate object, and that characteristic bacteria were found in several cases without the production of exudation or ulceration, where the only suspicious signs were the spongy, friable and easily bleeding gums.

DR. S. MCCALL HAMILL asked what relation the development of the cases of Vincent's infection bore to the administration of the diphtheria antitoxin. He thought it possible that there might have occurred some reduction in the resistance of these children following injection of the diphtheria antitoxin, which might have made them susceptible to infection by Vincent's organisms present in their mouths. Dr. Kolmer, formerly resident physician in St. Vincent's Home, had made smears from the mouth of every child showing spongy or suppurating gums or any form of mouth lesions. Every smear showed fusiform bacilli and spirilli. In control cases these organisms were not found. In the course of, or following, acute infection there seemed established a susceptibility to Vincent's infection. This was especially true of measles; of 40 cases dying, 15 had severe Vincent's infection, either in the mouth or throat. These lesions determined the fatal outcome in

some, and probably in all cases. Dr. Hamill did not believe that the widespread occurrence of Vincent's infection was due to direct contagion at the time of the epidemic, but rather to infection by organisms which had been present in the mouth, becoming virulent because of the lowered resistance produced by the infection. He thought it likely, therefore, that the administration of antitoxin in Dr. Fraley's cases had played some part in the production of the epidemic. He realized the contagious nature of the disease, citing the case of another resident physician in St. Vincent's Home who had a severe attack of Vincent's angina after having one of the children cough in his face. Dr. Hamill believes that the disease in its mild form is common outside of institutions. He had been able, especially during the past winter, to demonstrate these organisms in smears made from slight lesions of the mouths of children coming to his dispensary service. In the treatment of these lesions Dr. Hamill has used potassium chlorate internally and locally. His results have been so satisfactory that he considers the drug almost a specific. It is important to apply the saturated solution to lesions of the margins of the gums with a small swab, getting the solution well into the suppurating surfaces.

DR. HOWARD CHILDS CARPENTER said the condition was interesting from a diagnostic point of view. The organisms do not grow on ordinary culture media. Ellermann was able to isolate a pure culture of the fusiform bacillus by growing it anaerobically. The spirillum had not been grown artificially. In cultures from cases of Vincent's angina pseudodiphtheria bacilli are generally obtained. In Dr. Carpenter's experience the most frequent sites affected are along the gum margins, on the inside of the cheeks, and, lastly, on the tonsils. In one of the severest cases he has seen the entire uvula and part of the soft palate sloughed away; the child, after a long illness, eventually recovered. Cases in which the gum margin was affected were most resistant to treatment, as the organisms work their way under the gums and between the teeth. He has had best results from the applications of tincture of iodine to the gum margins.

DR. HAMILL added that the spirillum had been cultivated. Dr. Ruth Tunicliffe, among others, had demonstrated the relationship between the fusiform bacillus and the spirillum in anaerobic cultures. The photomicrographs which she published in the

Journal of Infectious Diseases, 1906, showed the various gradations between the two forms very beautifully.

DR. R. S. MCCOMBS spoke of a case which he had shown three years ago before the Society, in which Dr. Carpenter had recognized Vincent's angina from the odor of the child's breath. It was a primary tonsillar case and was well in three days, potassium chlorate having been used. He inquired whether it was necessary to report such cases to the Board of Health.

DR. FRALEY said that the cases developed five days or later after the administration of the antitoxin, which had not produced any rashes or constitutional symptoms. The children received by this institution had been so neglected and vitally depressed that they readily contracted any disease to which they became exposed. He also advocates the old name of ulceromembranous stomatitis or pharyngitis as being more accurate; for, although Vincent demonstrated that definite organisms were the cause of the disease, the condition is by no means always seen as an angina; furthermore, it seems undesirable to name diseases after individuals when more scientific nomenclature is available. The disease at present is not one of those required to be reported by the Philadelphia Board of Health, though it ought to be reportable.

DEGLUTITION PNEUMONIA FOLLOWED BY PULMONARY ABSCESS.

DR. S. SEILIKOVITCH reported this case. (See page 288.)

DR. GRIFFITH said that the case had been so carefully studied and treated that, when he saw her, there were no suggestions which he could make. There was no doubt of the cavity formation, and no tuberculosis could be shown. Dr. Griffith recalled a case of pulmonary abscess due to an inspired watermelon seed.

DR. C. Y. WHITE said that this form of pneumonia and pulmonary abscess was very commonly seen in animals.

DR. HAMILL said that the extensive literature relating to opsonins and vaccine therapy left one very much confused as to the actual status of these measures. As to therapy, highly satisfactory and very unsatisfactory results are reported in relation to the same disease, and both by capable men. In some conditions the treatment is unquestionably valuable, but in cases such as the one just reported results seem to have been of little value.

DR. SEILIKOVITCH said that the question of surgical inter-

ference was interesting to him. Could the child have been saved by operation? Unfortunately, the general condition was so bad when the abscess was certainly recognized that very little could then be done. He considered the condition due to the postpharyngeal abscess, which was followed by pneumonia, and this in turn complicated by the pulmonary abscess and the proctitis. He believes that the pus swallowed or expectorated by the child was so offensive that it caused the vomiting; and the proctitis was also due to the swallowed infection. On account of the various germs found in the sputum the vaccines used were simply given in an attempt to help the child.

SPASM OF THE ANUS CAUSING CRYING IN AN INFANT. By Dr. Planchu (*Lyon Médical; Ref. Jour. de Médecine et de Chirurgie pratiques.*) The author reports the case of an infant in whom continual, loud and violent crying was causing spasm of the anus, without any apparent anatomical lesion. The child was quite healthy, but began to cry when about one week old. Examination revealed a perfectly normal condition throughout. The movements were normal, and the child thrived steadily. Nevertheless, it cried almost continuously day and night, only sleeping in all about two hours a day. Planchu tried everything in vain, including a change of nurse. The convulsed face and spasmodic movements of the limbs pointed to pain, the origin of which had to be found. Weill was called into consultation. At the end of his examination he sought to examine *per rectum*, and was struck by the firmness of the contracted sphincter. He thereupon proceeded to dilate several times, using his little finger for the purpose. Following upon this, the child slept soundly for three hours, then took a meal, and slept again. Crying began again during the night, but was immediately quieted by anal dilatation. This procedure was required once more on the following day, after which the child became quite quiet, slept well, and enjoyed perfect health. Planchu has since, in like manner, dealt successfully with similar cases, and Leclerc recalls, in this connection, the common practice among mothers and nurses of introducing a suppository, or even a piece of soap, through the anus when a child cries. Even if an action of the bowels is not caused the children are very often quieted."—*Post Graduate*.

CURRENT LITERATURE.

ABSTRACTS IN THIS NUMBER BY

DR. SAMUEL FELDSTEIN.	DR. G. R. PISEK.
DR. B. RAYMOND HOOBLER.	DR. FRITZ B. TALBOT.
DR. M. C. PEASE, JR.	DR. S. W. THURBER.

DISEASES OF EAR, NOSE AND THROAT.

WRIGHT, JOHN DUTTON: THE DEAF CHILD AND THE PHYSICIAN. (*The Journal of the American Medical Association*, December 25, 1909, p. 2,155.)

Wright points out that on the general practitioner and the consultant rests in a large measure the responsibility for the highest welfare of the deaf child.

Deaf children he divides into three classes: (1) those totally deaf, either congenitally or in early infancy; (2) those rendered deaf by accident or illness after speech and some language have been acquired; (3) those partially deaf, but with enough hearing to acquire some speech and language through shouting near the ear.

The first class must be taught language and speech without the aid of the ear, while the other two classes must have their speech preserved and improved by careful instruction. All three classes must be taught to understand the speech of others by the sense of sight alone or by both sight and ear. The writer impressively says that a child possessing normal speech even to eight years will lose it and become a deaf-mute if hearing is lost and he is not promptly given special instruction to preserve his speech. Trained instruction should be begun not later than six years of age, and if the physical condition permits, at four and a half or five years.

The great body of deaf children are bright and normal mentally, and it is unjust to compel the state institutions to include the few abnormal and feeble-minded among the bright ones simply because they are deaf. The feeble-minded deaf should be segregated and taught in schools by themselves as are the hearing feeble-minded.

The physician should lend his intelligent aid in placing the deaf child in the school best adapted to his needs.

G. R. PISEK.

PATHOLOGY.

LESNÉ, E.: CLINICAL ANAPHYLAXIS. (*Annales de méd. et Chir. Infantiles*, No. 2, January 15, 1910.)

The idiosyncrasy of certain children to milk or eggs, and, in later life, to shellfish or strawberries, is explained by anaphylaxis. He cites as an example the case of a girl eight years old who suddenly was upset by an egg, which caused urticaria, vomiting, abdominal pain and diarrhea. Egg was omitted from the diet for four months and then tried again, with a return of all the symptoms.

Fritz B. Talbot.

MEDICINE.

WIRGMAN, C. WYNN, AND TURNER, H. WATSON: LOCAL SEPSIS AS A FACTOR IN RHEUMATISM AND GOUT. (*The Lancet*, December 4, 1909.)

The authors believe that many cases of gout and rheumatism may be explained as the result of a local infection occurring in the tonsils, in the gums, as pyorrhea alveolaris, or in some local infection in the nasal cavities. In 2 of his 42 cases reported, the condition was noted in children, both of whom had septic tonsils. He believes a great many carious teeth furnish the gateway of infection. He suggests preliminary treatment of teeth, tonsils and adenoids, which often will effect a cure without further specific treatment by salicylates.

B. Raymond Hoobler, M.D.

FUSSELL, M. H., McCOMBS, R. S., DE SCHEINITZ, G. L., AND PANCOAST, H. K.: ACHONDROPLASIA. (*The Journal of the American Medical Association*, November 13, 1909, p. 1,614.)

In this interesting paper the characteristics of achondroplastic individuals are given somewhat as follows:—

The trunk is of about normal length, the short stature being due in large part to the short limbs. There is marked bowing of both the upper and lower extremities, with an unusual prominence of the points of attachment of the muscles. The fingers are

relatively of the same length, with a peculiar separation of the second and third fingers at the second phalangeal joints, causing the fingers to spread out into the so-called "trident hand." Owing to the early union of the base of the nose to the skull there is a "pug-nose," which has frequently caused a mistaken diagnosis of congenital syphilis to be made. The vault of the cranium is unusually large as compared with the base of the skull and the face. The pelvis is small. Lumbar lordosis and a protuberant abdomen are always present. Of interest for the diagnosis are the facts that the hair is soft and abundant, the mental development entirely normal, and the genitalia and sexual instincts such as would be found in any well-formed adult. There is a tendency to a superabundance of fat. The deformity is congenital but becomes more apparent as the individual grows. Decentralization of the body is marked, the umbilicus being always below the middle as contrasted with the normal individual in whom after the first year it is above the middle point. Owing to the tendency to hydrocephalus, to visceral weakness, and prolapse of the cord, there is apt to be premature birth and consequent death of the fetus. After birth these children are so handicapped with grave nervous disease and lack of general nutrition that early death is common.

According to the authors there is in this disease an insertion of the periosteum between the epiphysis and diaphysis, so that the ossification of the cartilage cells in the primary aroela is hindered. The epiphysis and diaphysis are sometimes united.

Heredity plays a part in many of these cases, but there are a certain number in which such an influence does not come into play. Syphilis has nothing to do with achondroplasia. A case in point being cited of an achondroplastic born of normal parents. Both these parents later contracted syphilis, and the mother gave birth to a syphilitic child that was free of any achondroplasia.

The authors state that the X-ray will at once differentiate this condition from all other bone disease. In achondroplasia the lesion is in the cartilage and is complete at birth, the deformities being merely exaggerated with the growth of the child. The epiphyses are about normal, the enlargement at the ends of the bones being due to cup-like projections of the diaphyses. That achondroplasia is not a form of rickets is shown by the fact that while rickets occurs in any of the bones, achondroplasia is limited to those bones which are laid down in cartilage. Furthermore, in

rickets the bones are soft and there is a tendency to recovery, but in achondroplasia the bones are hard and the lesion is a permanent one. The pug-nose, which in syphilis is due to actual bone disease, is in this case a consequence of a premature union of the bones at the base of the skull. In a word, achondroplasia is a permanent defect in the cartilage, and if this fact can be determined the disease is at once differentiated from all other bone conditions.

Treatment offers no relief; and for this reason an accurate differential diagnosis from rickets, cretinism, and syphilis—conditions quickly relieved by appropriate treatment—is most important. The most that we can promise these unfortunates is that they will grow up to a normal mental caliber.

M. C. PEASE, JR.

ANATOMY.

POTTER, PETER: THE TOPOGRAPHIC ANATOMY OF THE THYROID GLAND. (*Annals of Otology, Rhinology and Laryngology*, December, 1909, p. 671.)

Three methods of taking measurements were used, *i.e.* (1) by sagittal section; (2) by transverse section, and (3) by dissection. As measured by dissection in the adult, the isthmus lies over the last cervical and first dorsal vertebræ. It also lies upon the first three rings of the trachea, but never overlaps the cricoid to any extent. The apex of the right lobe extends from the upper part of the fifth to the lower part of the sixth cervical vertebræ. The apex of the left lobe is never higher but often a little lower than the right.

In the child the upper border of the isthmus touches the cricoid in the majority of cases, and the cricoid is frequently covered. The first ring of the trachea is practically always covered by the isthmus, as are also rings two and three. The lateral lobes are proportionately larger than in the adult, so that the sternothyroid muscle is displaced upward and forward. The gland in the fetus corresponds to that in the young child, with perhaps the still larger proportionate size of the lateral lobes, especially in their upper poles.

This above comparison goes to show that there is an apparent descent of the gland upon the neck organs during the growth of the individual.

S. W. THURBER.

INFANT FEEDING.

FINDLAY, LEONARD: THE NATURAL AND UNNATURAL FEEDING OF THE INFANT. (*Glasgow Medical Journal*, February, 1910, p. 83.)

The author discusses the most recent views on the differences between human and cow's milk. Not only are there essential differences between the proteids and fats of these milks, but also in the quantity and quality of the inorganic salts. That whey is not entirely harmless has been shown by the experiments of Meyer, who found that healthy and sick children fed with a mixture of human whey and cow-curd did well; whereas, when healthy infants and those convalescent from gastrointestinal affections were fed with cow-whey and human-curd they became ill. Finkelstein's studies on the antagonistic action of sodium and calcium salts are mentioned. Sodium salts when ingested produce a rise in temperature, increase in weight, and increase in electrical excitability. Calcium salts produce a lowering of temperature, fall in weight, and diminution in galvanic irritability of the muscles.

The beneficial effects of milk dilutions may perhaps be due to the diminution in the quantity of inorganic salts.

The recent application of the principles of immunity to the investigation of the problems of infant nutrition has yielded some interesting results. Pfaundler, as a result of his studies, contends that the hemolytic power of an infant's serum is a measure of its nutritive potentiality, the more hemolytic complement its serum contains the less likely are digestive disturbances.

The author, in collaboration with Fua and Noeggerath, made an extensive investigation on the complement content of the serum in over 100 infants at the Berliner Stadtische Kinderasyl. His conclusions are radically different from those of Pfaundler. Complement was found directly proportionate with age, the older the child the more complement. Complement thus behaves like the natural immune body, which, according to the researches of Gewin, is practically absent during the first weeks of life.

S. FELDSTEIN.

BOOK REVIEW.

THE INTERNATIONAL MEDICAL ANNUAL: A YEAR BOOK OF TREATMENT AND PRACTITIONER'S INDEX. By many contributors. Illustrated. Pp. 762. Twenty-eighth year. New York: E. B. Treat & Co., 1910.

This well established work, now appearing in its twenty-eighth year, has been much enlarged over the previous issues, so that it now presents quite a formidable volume as a review of the year's advance in all branches of medicine. It is a well made volume, and, as usual, presents many plates of striking excellence, including some on urinary deposits, which should prove very useful.

Among the special articles of note in the present volume are Sea Water Injections, by S. Robert Simon, M.D., University of Paris, with some excellent photographic reproductions of actual cases; that on Introduction to Treatment by Bacterial Vaccines, by A. Butler Harris, M.A., M.B.; on Cancer, by W. Sampson Handley, M.D., F.R.C.S.; on Tropical Diseases, by J. W. W. Stephens, M.D.; on Hormones, by Dr. Emil Novak, of Baltimore. The Medical Diseases of Children is, as usual, in the able hands of Dr. George Frederic Still.

In spite of the abundance of the material, one is not embarrassed by its riches, for the manner of abstracting is brief and very much to the point, and the book is so well arranged and indexed that it is but the matter of a moment to find just what is desired. As a basis for systematic brushing up and review, the Annual is invaluable. The practitioner who possesses several volumes can, in the course of not very many minutes, follow the progress of a particular line of work and become acquainted with the literature in a very satisfactory manner.

How the book can be produced for the sum asked is a matter for considerable surprise.

MISCELLANEOUS.

AMERICAN PEDIATRIC SOCIETY.

PRELIMINARY PROGRAMME.

*The Society will hold its Twenty-Second Annual Meeting at
Washington, D. C., May 3, 4 and 5, 1910.*

TUESDAY, MAY 3D—OPENING SESSION—10 A.M.

1. President's Address, David L. Edsall, M.D., Philadelphia.
2. An Experimental Study of the Food Reactions in the Infant
Stomach, Compared with Those *in Vitro*,
D. M. Cowie, M.D., Ann Arbor, Mich.
Wm. D. Lyons, M.D., Ann Arbor, Mich.
3. The Estimation of Chlorides in the Stomach Contents from
Normal and from Atrophic Infants,
A. H. Wentworth, M.D., Boston.
4. A Study of the Gastric Contents and Mortality in Breast-
Fed and Bottle-Fed Infants,
Henry Heiman, M.D., New York.
5. Studies of the Effect of Varying Quantities of Fat and of
the Presence of Various Salts upon Digestion and
Metabolism,
Chas. A. Fife, M.D., Philadelphia.
B. S. Veeder, M.D., Philadelphia.
6. Buttermilk Feeding, with Studies of Bacteriology and
Metabolism,
Chas. A. Fife, M.D., Philadelphia.
H. C. Carpenter, M.D., Philadelphia.
7. The Results of Substitute Feeding in Premature Infants,
Maynard Ladd, M.D., Boston.
8. Duodenal Ulcer in Early Life,
J. P. Crozer Griffith, M.D., Philadelphia.

TUESDAY, MAY 3D—2:30 P.M.

THE OPENING SESSION OF THE CONGRESS OF AMERICAN PHYSICIANS AND SURGEONS.

Subject to be considered: "Artificial Immunization."

Papers by Drs. Hektoen, Chicago; Gay, Boston; Beebe, New York City; Brinckerhoff, Honolulu.

Discussion by Drs. Adams, Stengel, Loeb, Anderson and others.

8 P.M.

Address by the President of the Congress, Edward L. Trudeau, M.D., LL.D., "The Value of Optimism in Medicine," to be followed by a reception.

WEDNESDAY, MAY 4TH—SECOND SESSION—10 A.M.

(In conjunction with the American Orthopedic Association.)

9. The Pathology of Poliomyelitis, Israel Strauss, M.D.
10. Experimental Epidemic Poliomyelitis and Its Relation to Poliomyelitis in Human Beings, Simon Flexner, M.D., New York.
11. The Clinical Aspect of Poliomyelitis; Types; Communicability; Mortality, L. Emmett Holt, M.D., New York.
12. Infantile Poliomyelitis; Its Relation to the Community in Reference to Etiology and Prevention, R. W. Lovett, M.D., Boston
13. Treatment for the Amelioration of Permanent or Partial Paralysis by Silk Tendons and Silk Ligaments, Prof. D. Fritz Lange.
14. Paralysis of the Neck and Diaphragm in Poliomyelitis, Irving M. Snow, M.D., Buffalo.

THIRD SESSION—3 P.M.

Vaccine Therapy.

15. General Considerations Regarding the Effects of Vaccines,
S. McC. Hamill, M.D., Philadelphia.
16. The Use of Bacterial Vaccines in Children's Diseases,
John Howland, M.D., New York.
B. R. Hoobler, M.D., New York.
17. General Discussion.
18. A Comparison in Boys and Girls of Weight, Height,
Epiphyseal Development,
Thos. Morgan Rotch, M.D., Boston.
19. The First Sound of the Heart in Children,
F. Forchheimer, M.D., Cincinnati.
20. Discussion: The Value and Limitations of the Employment
of Cold Air in the Treatment of Acute Respiratory
Conditions. Opened by
J. P. Crozer Griffith, M.D., Philadelphia.
21. Retained Intubation Tube; Abductor Paralysis (Diph-
theria); Recovery, W. P. Northrup, M.D., New York.

10 P.M.

Smoker, to be given by the Congress at The Arlington.

THURSDAY, MAY 5TH—FOURTH SESSION—10 A.M.

22. Executive Session; Report of the Council.
23. Obituaries on A. Steffen and Alois Monti,
A. Jacobi, M.D., New York.
24. Inferences Drawn from the X-Ray Treatment of Status
Lymphaticus, B. K. Rachford, M.D., Cincinnati.
25. The Bacteriology of the Blood in Early Life,
F. S. Churchill, M.D., Chicago.

26. The Chronic Rheumatoid Affections of Childhood,
Henry Koplik, M.D., New York.
27. A Study of Eighty Cases of Empyema in Children,
F. Huber, M.D., New York.
28. A Case of Typhoid Mania in a Child,
Allen Baines, M.D., Toronto, Ont.
29. (a) A Series of Cases of Meningitis, Illustrating Different
Etiological Types,
(b) The Cytodiagnosis of Tubercular Meningitis and the
Possibility of Recovery,
Chas. Hunter Dunn, M.D., Boston.
30. Acute Pericarditis in Children,
David Bovaird, Jr., M.D., New York.
31. (a) Myotonia Congenita,
(b) Recurrence of Scarlet Fever,
J. P. Crozer Griffith, M.D., Philadelphia.
32. Chylous Ascites in Infants,
D. M. Cowie, M.D., Ann Arbor, Mich.
33. Subject to be announced,
Rowland G. Freeman, M.D., New York.
34. Subject to be announced, John Howland, M.D., New York.

DAVID L. EDSALL, M.D., *President.*

SAMUEL S. ADAMS, M.D., *Secretary,*
1 Dupont Circle, Washington, D. C.

The recently published account of the New Jersey State Pediatric Society stated that the organization was effected in Newark on February 3d, but the Society was organized in Hackensack on the evening of January 11th in connection with a symposium on "Infant Feeding" by the Bergen County Medical Society.

M. J. Synnott,
Secretary.

ARCHIVES OF PEDIATRICS

MAY, 1910.

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ORIGINAL COMMUNICATIONS.

ANNUAL ADDRESS OF THE PRESIDENT, AMERICAN PEDIATRIC SOCIETY.*

BY DAVID L. EDSALL, M.D.,
Philadelphia, Pa.

The honor of serving for a year as the president of a group of men who are the highest representatives of their type of work in this country imposes upon one, as I conceive of it, the duty not merely of giving expression to complacent satisfaction, but also of devoting serious thought to the activities that may be open to the members of the Society as individuals or as a group by means of which they may still further advance the honorable standing of the work that is their chief concern in life. I am in a somewhat dangerous position in approaching this duty, for since my own work has come to be more largely outside the field of

* Read at the Twenty-second Annual Meeting of the American Pediatric Society, Washington, D. C., May 3, 1910.

pediatrics than in it I may easily find myself presenting much the same appearance to you, the masters of pediatrics, as does the occasional maiden lady of philanthropic tendencies who would instruct mothers in suitable methods of training children. This is the more likely to be the case inasmuch as the attempt to urge new activities upon you involves not only the giving of unsought advice to those who are my superiors, but also it carries with it some suggestion of criticism in that it presupposes that I consider those things that have been done to be not yet sufficient. I recognize fully, however, that the things that I have to say cannot be considered exactly as advice, inasmuch as they are not my own thoughts alone, but in more or less the same form are uppermost in the minds of many others among you; and as to any flavor of criticism, this is due not to any lack of appreciation of what has been done, but to my feeling that in spite of all that has been done, proper dignity and regard are not yet generally accorded in this country to a subject which, it appears to me, is unquestionably the broadest and most complex and the most important division of general medicine, and proper standing will not be generally given to pediatrics in this country until better things are demanded for it by concerted action, and until also better things are in certain ways demanded of it by a large group of those who are the recognized leaders.

The dignity of any of the intellectual pursuits and the standing which it has in comparison with other things related to it are determined chiefly by two things. First of all, I think, by the opportunities offered those who teach the subject and by the manner in which these opportunities are made use of; and, second, by the extent to which those who follow that pursuit engage in matters that favorably affect the welfare not only of those individuals with whom they come in immediate contact, but rather of the public at large. There are, it appears to me, ways in which greater usefulness could be secured for pediatrics in both of these directions, and I believe that this society could rapidly, by the strength of carefully planned concerted action, greatly benefit the position of the work which it represents. It may appear to many of you somewhat out of place for me in addressing this society to devote most of my time to the question of the teaching of pediatrics, but I think an apology for doing so is hardly necessary, partly because most of you are teachers, but also for a much broader reason than this; that is, it is undeniable that while

teachers are far from constituting the only persons who have a determining influence upon the progress of their subject, they do have a most serious responsibility, not only because each of them has charge of a limited group of students, but much more because the methods they pursue chiefly determine the standards that are demanded in that subject, and even more important than this the teacher and his methods largely determine the quality of the future exponents of his subject, not merely through the actual information that he disseminates among students, but through his directly attracting a better or worse group of men into that subject as their life work. The appearance of attractiveness of any subject to those who have not yet chosen their own special careers is most largely dependent upon the inherent interest in the subject itself and upon the breadth of view and enthusiasm of the teacher, but it is also, and often equally largely, dependent upon the halo which is given to the subject by the facilities which are provided for the teacher. It would be quite unsuitable and unnecessary for me to enter into a discussion of the worth of individuals who have charge of the teaching of pediatrics in this country. I may dismiss this point by saying that among their number are men who have in certain ways no superiors in any part of the world. Concerning the provision made for their teaching, however, there are points which may justly be commented upon and not wholly favorably. I recently had a long discussion regarding medical education with one of the ablest educators in this country, and he told me most forcibly that an extended inspection of medical schools had convinced him that, considering its importance, pediatrics is more inadequately provided for in most medical schools than any other important subject; and he frankly said that, considering the importance inherent in this subject, the conditions surrounding it are, in most places, shameful. He had investigated almost solely the best schools in this country. On the whole, I think we must agree with him in large part. I would hasten to say that his criticism was of the general group of schools that he had seen, not of all the individual schools, and it does not apply in a number of instances where the system of teaching is relatively excellent, but at the same time I would say that nowhere is the provision made for the subject as good, even relatively, as that which is made for general medicine, general surgery and obstetrics in a number of schools where these subjects are particularly well cared for. In fact, I may fairly say

that a more directly comparable branch of work, neurology, has much more actual standing and recognition in the general group of our best medical schools than has pediatrics; yet I am personally convinced that the problems of infancy and early childhood are much more distinct from general medicine than are the problems of neurology, and consequently they more properly demand generous provision for instruction in them. They are at the present stage of our knowledge surely very much more important practically to the student.

An extremely striking, and, I believe, direct, result of the existing academic state of pediatrics is that not only does the individual student receive in most places very inadequate training in the subject; even more significant than this is the fact that fewer able young men than might properly be expected to do so go into pediatrics as contrasted with the number of such men that go into general medicine, and the number is less even than of those who go into neurology; for at the present day we may certainly say that there are in this country at least twice the number of men of recognized distinction in neurology than there are in pediatrics. The explanation for this is, I think, a reasonably patent one, and while the responsibility may properly be thrown in part upon the shoulders of the administrators of medical schools, it cannot be put wholly upon them and must be shared by pediatricists themselves.

It is a common, and, on the whole, a seemingly just, statement that the clinical branches have in this country in the past generation by no means kept pace with the medical sciences in their methods of teaching and investigation. I would especially point out here that in mentioning research as I have just done, I do it purposely, but not at all with the idea of pleading at the moment for research. I speak of it with the view of pleading for better general conditions in teaching, for it is, I believe, a well recognized fact among educators that in most instances, unless a man does some kind of research more or less continuously, he does not make or, at any rate, does not long remain, a sound teacher, simply because the teacher must, in order to make the student search for knowledge, search diligently and continuously himself. Therefore, aside from the usefulness of knowledge gained through research, the kind of research work that is produced in any particular department is commonly accepted, and rightly so, as the best individual criterion of the degree of progres-

siveness that the teaching in that department will exhibit. Now during the past generation the medical sciences have been transformed from subjects that served chiefly to give those who taught them dignity and high position in closely related forms of practice, into subjects that of themselves furnish chosen and enviable careers to many of the best men in the profession. An inevitable and happy result of this has been that as they have assumed greater dignity and seriousness they have demanded and secured greater facilities and opportunities for teaching and research, and have in both these ways advanced with tremendous rapidity.

With the clinical branches no such fundamental change in point of view has occurred and none is possible; for continuous touch with practical matters is essential in the teaching of things that are necessarily practical, and therefore the teaching of clinical work cannot be wholly separated from practice. It has been impossible consequently to start wholly fresh in these subjects upon an altogether new basis, and hence whatever change there has been in them has been in details rather than in general plan. Hence they still retain some of the casualness in teaching and research that the medical sciences cast off when they became purely academic subjects. Nevertheless there have been very significant forward steps in these branches and the occasional criticism of them that they have shown little, if any, progress is not by any means as well justified as it seems upon superficial consideration. I sincerely believe, however, that such a criticism is better justified when directed at pediatrics than when any other of the most important subjects in medicine is aimed at.

The chief essentials for making well trained men and for attracting first-class men into a subject as their own work are that the men shall do most of the work themselves and not merely be told about it; that they shall be made precise and critical in their methods, and that the craving for a sound understanding of the reasons for things be satisfied by having them clearly comprehend the relation between the fundamentals and the practical things. In all these ways general medicine and general surgery have been quite transformed within two decades in a large group of our best medical schools, and now, instead of the instruction being as it was earlier, almost wholly didactic and at best given in the form of clinical lectures to large classes, students do most of their work in wards and dispensaries, either in small groups or, still better, as individuals, acting practically as temporary assistant

internes. Precision and a critical point of view are given them through the fact that purely observational methods, which always have an indeterminable amount of error associated with them, are supplemented by the employment of laboratory methods and instruments of precision, which not only give added information, but have the invaluable element of demanding accuracy and precision in their use and thus training into more precise habits. The craving for a fundamental understanding of facts that are rather baldly stated in text books is, in some places at least, being vigorously met by coöperative teaching between clinical and anatomical, physiological, pathological and other departments, or by much greater attention to these matters on the part of the clinical teacher, so that in either case the important bearings of the fundamentals upon clinical matters are brought prominently forth in immediate relation with the clinical teaching. In fact, a fair knowledge of physiology and pathology have become almost as important a part of a clinical teacher's training as is clinical experience itself, and that this is well recognized grows increasingly evident when one notes the character of a considerable group of appointments to important chairs in recent years. What I have said in regard to general medicine and general surgery is, to a large extent, true also of neurology, and to some extent of certain of the other specialties. There has likewise been movement in this regard in obstetrics and gynecology, though perhaps to a less degree than should have been the case. When we consider what has occurred in pediatrics I think we must admit that the changes have been much slighter and less distinctive. There has been decidedly less opportunity given the student to work himself upon cases, and in many of the best schools he still sees children solely, or almost solely, through the eyes of the instructor. This is due to the fact that while the opportunities for actual work in wards and for bedside instruction in small classes have been growing everywhere in medicine and surgery, there are scarcely anywhere pediatric wards where students are freely permitted to do things themselves. The critical difference then is that while in medicine the student not only may, but in the best departments must, get extensive training in working out for himself the history, the physical examination, the examination of secretions, etc., in a series of cases, and often must, under the control of the instructor, plan out and follow the treatment, in pediatrics he usually does but a fraction of this;

and as a necessary result cases are less frequently seen as problems to be worked out by the student himself than as problems which the instructor both points out to him and solves for him. Naturally this is less attractive to the best men. Healthy-minded persons enjoy eating more than they do being fed. Guidance by instructors is, of course, essential, but it must be guidance in the methods of attacking problems rather than in the actual solving of these problems, especially when the students reach their final year. Furthermore, unless they do the work themselves the lack of opportunity of bringing for themselves all the methods of precision to bear upon each case leads students into less exact methods and into less respect for the subject that they are dealing with. Again, as I said, I believe the serious-minded student takes a deep interest in any subject only when he has clear conceptions of its relations to those things on which it is based. This is to my mind the most important side of the matter that I am discussing, though not usually dwelt upon. It is, it seems to me, the crux of the whole situation in so far as the character and number of the men going into pediatrics is concerned. So far as I can see, the propriety of studying pediatrics as a special subject rather than as a mere part of general medicine is based essentially upon the fact that the infant and young child differ from adults enormously in degree and almost equally in kind, in susceptibility to infections, and especially in liability to derangements of nutrition. This constitutes a really profound difference, it appears to me, and gives much greater justification for specialization than any that is based upon the different organs of the body, for it demands of those who would enter into pediatrics in a broad spirit very wide and subtle knowledge of the two types of work that are now, and probably will be for years to come, the most progressive and most productive lines of work in all medicine, but that are at the same time the most complex and difficult. I mean, on the one hand, infection, immunity and hygiene; on the other, the physiology and pathology of nutrition. In spite of the fact that these subjects are simply teeming with points that are of the most intense interest in acquiring sound and broad methods of practice, there are certainly scarcely any places where an attempt is made to bring out systematically and thoroughly their relation to clinical pediatrics. So far as these subjects are at all broadly dwelt upon by clinical teachers, it is almost entirely in courses on general medicine not in pediatrics, though they are of even more intense

interest practically in the latter. It is no wonder that in the eyes of many of the best students pediatrics becomes the tail to the general medical kite, when the things most intimately related to it are largely neglected in direct relation to it, but are taught in practical relation to other clinical subjects. As I have intimated, however, I think that we may more justly compare the conditions surrounding pediatrics to those in neurology rather than to those in general medicine, and, as I have said, to the disadvantage of pediatrics. But the same explanation of the different status of the two may be used here: In every place where neurology occupies a conspicuous position in the curriculum and is highly regarded by students it will be found that the fundamentals are most intimately related to the clinical teaching, and there are special courses, usually directly associated with the clinical teaching, for broadening the student in his knowledge of the anatomy, physiology and pathology of the nervous system.

The manner in which this disadvantageous state of things can be overcome is, I think, indicated by what I have just said. Students should be taught in the pediatric department, or by the pediatric department in association with other departments—and not simply in some department entirely separate from pediatrics—the important direct practical bearings of the study of the physiology and pathology of nutrition, of infection and immunity, and of all the fascinating things that fall under the name hygiene.

The overcoming of the difficulties in regard to the studying of cases can be accomplished only through demanding that the clinical work in pediatrics shall be put on the same basis as that which is being struggled for, and increasingly secured in medicine and surgery; that is to say, there shall be pediatric hospitals, or at least wards of really adequate size where the department shall be absolutely at liberty not only to show cases, but to put the students at work in whatever way it is believed will lead to the best training for them. This is an old story in medicine now, and no teacher in clinical medicine is content with anything less whether he has obtained it or not; especially is he not content with a rotating service where the system changes with each change in the service, where he is thoroughly familiar with the cases only during his own term of service, where any investigation must be wholly fragmentary and interrupted and where everything is more or less dependent from day to day upon the goodwill of his colleagues and the hospital managers. Pediatricists

have shown very much less evident activity in attempting to secure proper conditions of this kind and very much less apparent appreciation of the importance of such conditions than have those who are engaged in general medicine, surgery and obstetrics, and yet such conditions are, I had almost said, more important than in the other subjects mentioned, for little details that one becomes familiar with only by direct contact with them, and not merely by hearing of them, are determining factors in successful diagnosis and treatment with children almost more than with adults. Nowhere in this country are the conditions as good yet as they are in a number of places in the other subjects mentioned. In two schools there will soon be departments with model systems even better than the best that now exist, where the head will have entire authority in a good hospital, will have the academic dignity and the salary that go with high ability and wide training, and will have the power to plan his teaching in whatever way appears most efficient without regard to the fancies of the hospital managers; and where in return for these privileges it will be expected of him that he shall keep himself thoroughly trained, not only in pediatrics itself, but in the lines of work that it most intimately touches upon, and that he shall not only disseminate knowledge, but contribute to it, and train others to do the same. Certain of our most distinguished members have previously established eras in pediatrics in America, and one member, who is still stimulating us to higher ideals and better methods, is the veritable parent of the subject in this country. I anticipate that these new clinics will inaugurate another new era partly through the standards that they will set and that others must follow, but even more largely through the considerable group of highly trained men that the facilities provided in them will almost certainly lead into pediatrics as their life work.

Until conditions such as those that I have been discussing are generally recognized as the standard that is being striven for, I do not believe pediatrics will assume the station that it deserves in comparison with other divisions of medicine. Certainly dependence upon hospitals that are not thoroughly controlled through either ownership by the school or firm affiliation with it is an anomaly that is almost as damaging to the best ideals in medical education at the present stage of things as was the money-getting spirit of the teaching in the days of the old proprietary schools. It appears to me that this society could wisely take upon

itself a serious consideration of the manner in which teaching and investigation in this branch may be benefited, and then by both individual and concerted action further whatever appears to be wise. It is beyond question that acting as a group and with the power that comes through the name of the American Pediatric Society much could be rapidly accomplished. At this very time I know that a committee is preparing a report to one of our sister societies on the question of securing freer use of clinical material by students and better teaching facilities in other ways in the subject which that society represents. An authoritative report of this kind which will be recognized as representing not the ambitious desires of one man, but the earnest opinion of a commanding group of men, will have much force in bettering things if wisely used; indeed, I know of one or two schools that, knowing what this report recommends and desiring not to be found wanting when it appears, have already anticipated it and have advanced their standards to the point which it will demand.

In the earlier part of my address I spoke of the relation of men to the public at large as one of the main ways of being useful and one of the chief ways by which their usefulness is judged. There are a variety of ways in which this society could, I believe, act as the center for the dissemination of education, and particularly as the means through which knowledge could be acquired by us and by others interested in the subject in a considerable number of things which bear intimately upon the subject of pediatrics and which are of great importance to the public at large, but in which reliable information is difficult for every one of us to secure. Some of these were discussed to a slight extent at last year's meeting. The conditions in children's schools could probably be led into a much better state than they are now were there some sort of conference between important educators in these schools and representative pediatricists such as might be furnished by a committee of this society. Industrial conditions among children have deeply interested me in connection with industrial conditions in general, and there is no question that they need study by persons of calm and judicial temperament so that we may be informed upon the actual state of affairs by those whose opinions would be more reliable than those of perhaps over-enthusiastic philanthropists. I do not agree with the view expressed last year that such questions are outside the realm of research and are rather matters of mere medico-legal interest. The more I have

studied occupational disorders the more fruitful a field of research I have found them. There are a number of other important questions relating to other parts of hygiene in which I believe this society could take a useful part and a part that would in no way interfere with its other activities; and it could thereby cover subjects which are at present not particularly cared for by any other group of qualified persons, and concerning some of which it is now well-nigh impossible to get any satisfactory information or to offer reliable advice. Such matters I cannot take up *in extenso*, as I have already consumed an undue amount of time. I should be very glad, however, to see members of the society, or the society as a whole, consider the relation of the society to such matters, and either proceed to take some active part in them or condemn any such plan definitely.

CONGENITAL BRONCHIECTASIS.—Z. Capuzzo (*Rivista di Clinica Ped.*, May, 1909) gives two forms of congenital bronchiectasis—atelectatic and fetal. When for any cause a portion of the lung remains unexpanded, during inspiration there is a negative pressure which brings about dilatation of the bronchi still accessible to air. These bronchiectatic conditions occupy a single lobe of the lung or a small portion of one, there being no signs of inflammation or of anthracosis. These portions may or may not communicate with larger bronchi. Such a condition may be well borne throughout life. Atelectatic bronchiectasis is extremely rare, only 9 published cases being found, of which the author gives an account. Fetal bronchiectasis may be total or partial. It arises from a cystic degeneration of the interior of a bronchus with all its collateral branches. Nineteen cases have been published. As to the etiology little is known. There seems to be a combination of a passive mechanical action due to the increase of liquid transuding from the capillaries, with an active proliferation of the epithelia not truly neoplastic, but hyperplastic. Fetal bronchiectasis may depend on an arrest of development after the third or fourth month of fetal life, with hyperplasia of the epithelium. The symptoms are cough, dyspnea, cyanosis, and asthmatic attacks, coming on some weeks or months after birth.—*American Journal of Obstetrics.*

CIRCULATORY FAILURE IN THE ACUTE INFECTIONS OF CHILDREN. CAUSES AND TREATMENT.*

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The majority of physicians are not therapeutic nihilists, and most of us believe that much good can be accomplished by the proper administration of drugs. Were we asked if it were possible for us to influence favorably a failing circulation, we would unanimously give an affirmative answer. With this unanimity of opinion it, therefore, seems strange that to accomplish the same end such a variety of measures are employed by different men and by them extolled as the most trustworthy and efficient. As a specific example: In the treatment of pneumonia it will be found that alcohol, strychnin, nitroglycerin, digitalis, caffein, camphor, etc., each have their adherents as agents in resisting circulatory failure, and all are used with thorough reliance upon their virtues. It is most unlikely that all these drugs are similar in action and of equal efficiency; far more probable is it that there is lack of agreement as to the causes of the conditions which these drugs are used to combat and as to the action of the drugs themselves. And yet it seems to me there is sufficient experimental and clinical observation to warrant almost complete agreement as to conceptions and treatment. For this reason and on account of the importance of circulatory failure, I ask your attention to a review of the opinions that have been held as to the cause of this failure in infectious processes, of the experimental work that has been done in an effort to explain its production and finally to a consideration of those measures and drugs that theoretically would seem, and experimentally have proved to be, of value.

The subject of circulatory failure was first touched upon by the great clinicians of the early part of the last century. Fever was looked upon by all of them as the cause of the disturbance.

Stokes investigated with great care clinical symptoms and physical signs and came to the conclusion that the disturbance was due to cardiac weakness.

Laennec and Louis also studied symptoms and physical signs occurring during fever, and they also recognized the softness of the heart wall, its friability and brownish color after febrile death, but they did not connect the pathological findings with the circula-

* Read before the New England Pediatric Society, Boston, March 26, 1910.

tory failure. Stokes was the first to do this, and he wrote and taught that the symptoms of circulatory failure were to be referred to the condition of the heart. Nevertheless, he admitted that in all the cases the clinical and pathologic evidences did not agree.

The discoveries made by Virchow, in regard to the parenchymatous inflammation of muscle with their confirmation and extension by other pathologists, apparently lent great support to Stokes' belief in the dependence of circulatory disturbances in febrile conditions upon anatomic injuries to the cardiac muscle. Hayem first found interstitial changes in the heart in typhoid fever, and Birch-Hirschfeld and Leyden, independently of one another, described interstitial changes in diphtheria. Romberg studied typhoid, scarlet fever and diphtheria hearts and showed that a certain number of days—roughly seven to ten—is necessary for the production of the interstitial changes which develop without reference to the early parenchymatous changes and continue after the infection is no longer apparent. During the early acute period, of which I wish especially to speak, the parenchymatous lesions are the only ones present, but these were considered sufficient to account for circulatory failure. Other constant anatomic changes in the circulatory apparatus that might be held responsible have not been found. Death was, therefore, regarded by the majority of clinicians and pathologists as due to failure of the heart, which depended directly upon the anatomic changes in its structure.

There were, however, certain clinical observers who would not subscribe to these ideas. Dieulafoy, as long ago as 1869, thought that the majority of deaths in typhoid should be referred to what he called a neuromyolytic reflex.

Naunyn carefully studied circulatory failure in fever from the clinical standpoint. He was impressed with the similarity of symptoms in febrile animals and those whose vessels had been paralyzed by a section of the spinal cord. He says that according to his ideas, arrived at from the observation of animals in febrile collapse, it is absolutely impossible to say that the collapse in febrile conditions is due to heart weakness. Direct evidences of this entirely fail. In the majority of cases the heart remains regular and the pulse may be palpable until shortly before death. The heart sounds remain clear to the very end. Nor can the increased frequency be looked upon as a sign of cardiac weakness,

because with extensive cardiac disease, as in the late stages of diphtheria, the heart may be slow.

The pulse curve with the sphygmograph shows also diminished tension, as Marey, Landois, Wolff, Riegel and others had found, and Riegel obtained the same curves in fever as after the use of amyl nitrite, which so markedly reduces tension. Naunyn also regarded as especially important Quincke's observation that the arm veins in fever may pulsate, a phenomenon which indicates with the greatest certainty (when it is not due to tricuspid regurgitation) that a diminished tension of the vessel wall with a dilatation of the capillaries and a lowering of the arterial pressure is present. Riegel came to the same conclusions as Naunyn.

Rosenbach, in 1881, wrote against heart weakness as a cause of death in infectious conditions in no uncertain terms. He said: "I believe that I have every ground for asserting that the belief that the heart is the earliest and most severely affected organ has nothing to sustain it. This belief has its practical expression in our fever therapy, and the results of it are the exaggerated stimulating and antipyretic treatment. Certainly of the organs necessary to sustain life that which shows the most important changes in its texture is to be regarded as the cause of death, but our methods are not fine enough rightly to judge of the grade of severity of the lesions in the separate organs. Severe molecular disturbances, important tissue changes in the brain, escape notice on account of the paucity and uncertainty of our methods, while on the other hand, comparatively moderate disturbances, such as cloudy swelling of the heart muscle and slight grades of infiltration are easy to observe."

Thus good clinicians have failed to accept the view that the heart is the cause of circulatory collapse. Opposed to them were those who believed the heart to be the sole cause. But there was still a third party.

It has been stated before that Stokes admitted that in certain instances no gross lesions could be found in the heart, and later observers had the same experience. To explain this small proportion of fatal instances without apparent lesions, those believers in heart failure found it very easy after the advent of bacteriology and the introduction of the study of bacterial toxins to explain the circulatory failure on the basis of a functional interference with the cardiac muscle caused by the metabolic products of various bacteria. This hypothesis was also extended

to those hearts with pathologic as well as without pathologic findings. Hesse was, I believe, the first one to suggest such a functional disturbance, and he did it in regard to diphtheria; Griesinger followed suit in regard to typhoid fever and other diseases. Good clinicians, as for instance Krehl, believe in a certain amount of this influence, and it will be seen later that vague though it is this view receives experimental support in tests with the products of certain bacteria.

Thus there were three classes. First, and by far the largest in number, were those who believed in the anatomically diseased heart as responsible for circulatory failure; second, those who believed in a functional disability due to toxins with or without anatomic change; and, third, those who exonerated the heart entirely or chiefly and held to a paralysis of the vessels from central influences.

This is a convenient point to refer to three pieces of work, two of which were done more or less recently, since the deciding experiments of Romberg and Pässler, and Pässler and Rolly, which bear upon the view held by the first of these classes, viz., that the heart anatomically affected is responsible for death, and which had they been known at that time would have tended seriously to undermine this view. The first of these was the work of Krehl on hearts with fatty changes as the result of disease. Quantitative chemical examination showed such a very slight increase in the fat content that it could hardly be sufficient to affect seriously the cardiac activity. Krehl came to the conclusion that the fat content of the heart muscle bore no relationship to its capacity for work.

The second was the painstaking pathological study of Aschoff and Tawara. These investigators cut hundreds of sections from various parts of different hearts and decided that many of the changes frequently described as pathological were, in reality, artifacts, and the third was the experiment of Hasenfeld and Fenevessy. Hasenfeld and Fenevessy studied the capacity for work of fatty degenerated hearts. Phosphorus was used to bring about fatty changes and was given by mouth in doses sufficient to cause an enormous fatty transformation. Then, according to the methods of Romberg and Pässler, hereafter to be described, tests were made of the capacity of the heart to work against greatly increased resistance. The startling fact was disclosed that a heart degenerated by phosphorus even to the most extreme

degree was able to respond to tests almost as well as a normal heart. From such an experiment one obtains an idea of the enormous factor of safety with which the heart is endowed. All these three investigations, however, are negative in their results. They point away from the heart as the direct cause of death, but they do not show what is responsible. Romberg, Pässler, Müller and Brüns attempted to show this, and their results are so important and convincing that I beg your indulgence if I describe their methods and results in considerable detail and in almost their own words.

They made their tests with reliance upon the following facts: By strong stroking of the abdomen from below upward a considerable quantity of blood is driven out of the abdominal vessels into the heart. At the same time the flow from the left heart into the abdominal aorta is impeded. The heart is filled to a greater extent, it drives the increased amount of blood into the aorta against an increased resistance, and the blood pressure rises. The increased pressure, however, only occurs when the heart is strong enough to satisfy the increased demands made upon it. If its capacity is diminished the increase in pressure is less than normal or does not occur at all. The increase of pressure as a result of abdominal massage is then a test of the heart's power. The same is true of temporary compression of the descending aorta above the diaphragm. The blood pressure likewise rises in this case, provided the heart is capable, chiefly because it is compelled to work against an increased resistance. Abdominal massage and temporary compression of the aorta are, therefore, excellent means of deciding whether, and to how great an extent, the heart is capable of acting against increasing odds.

Certain sensory irritations of the skin or mucous membranes, such as cold to the skin, or faradization of the nose, call forth a reflex excitement of the vasomotor center in the medulla. A contraction follows in the vessels, chiefly of the splanchnic region, and the blood pressure rises. In order that an increase of pressure may take place the sensory paths, the vasomotor center, and the vasomotor nerves must be capable of stimulation and action. But beside this a capable heart is necessary for the production of increased pressure, for a weak heart would be as unable to overcome the resistance afforded by arterial contraction as it would the overfilling caused by abdominal massage. In a similar way asphyxia for about thirty seconds causes an increase

in blood pressure by a stimulation of the medullary vasomotor center.

By the use of these various manipulations, abdominal massage, compression of the aorta and stimulation by sensory stimuli and by asphyxia, it is possible to judge whether a circulatory disturbance, accompanied by lowering of the blood pressure, such as occurs at the height of acute infections, is caused by an injury to the heart or to the vasomotor center or nerves.

It was necessary to follow the progress of the infection in all its stages, and for this reason tests were made during the early febrile period, at the height of the fever and during the stage of circulatory collapse. Rabbits were used. They were injected with living organisms in relatively enormous doses for the reason that in this way circulatory collapse was caused much more promptly and regularly, and the time of its onset could be prognosticated with great accuracy, a point of much importance when it is necessary to observe such animals almost constantly and to be ready to carry out experiments at the different desired stages.

The organisms used were the diphtheria bacillus, which remains localized in the tissues and injures the whole organism through its toxins, the pneumococcus, which causes in rabbits a general septicemia, and the bacillus pyocyaneus, which occupies an intermediate position between the other two organisms and sometimes remains localized and at other times causes pyemia.

The blood pressure tests were made in the carotid artery under morphin narcosis.

In the first stage of the disease, that is, in the early febrile period, all the infected animals reacted normally to abdominal massage, to compression of the aorta, to faradization of the nasal mucous membrane, and to temporary asphyxia. Their hearts and vasomotor systems were therefore normal.

In the second stage, or that of threatened collapse, the general condition of the animal indicated an unfavorable outcome. In this stage the pressure showed a decided tendency to fall. Abdominal massage, however, caused throughout a great rise in pressure exactly as in animals in the first stage. The hearts were, therefore, as capable as ever of driving the increased amount of blood. But, on the other hand, stimulation of the vasomotor center showed that in all cases its function had suffered some damage. The increased pressure after sensory irritation and

asphyxia was plainly less than after abdominal massage, whereas normally it is as great or even greater. That the blood vessels themselves were unaffected was demonstrated by the intravenous injection of barium chlorid, which caused, as it normally does, a marked constriction of the vessels, accompanied by a rise in blood pressure.

In the third stage, when the life of the animal was momentarily threatened, the blood pressure sank to about 25 mm. of mercury as opposed to the normal of 80-90 mm., but the tests showed plainly what part of the circulation was at fault. Abdominal massage and aortic compression caused a great rise in pressure. The reaction to nasal faradization was absolutely *nil*, and to asphyxia greatly decreased. The difficulty was therefore with the vasomotor apparatus, and that the failure was not in the vessels was shown by the effect of the injection of barium chlorid when a marked vascular contraction with prompt blood-pressure rise occurred. The cause of such collapse must, therefore, lie in the center.

We have, then, throughout a practically competent heart and peripheral vascular apparatus, but a medullary center that at first shows signs of failure and then suddenly gives way. In almost all instances the blood pressure fell almost to zero, but respiration ceased before the heart.

It would take too long to enumerate the various criticisms raised against these experiments. They were not numerous or important save the one of von Stejskal. His criticisms were on purely technical grounds, but they impelled Pässler and Rolly with new methods to repeat the experiments. Their results were much the same, absolutely so as far as pneumococcus and pyocyaneus infections were concerned, but they found a marked diminution of the capacity of the diphtheria heart to work against increased resistance or to withstand the effect of asphyxia.

These experiments, first of Romberg and Pässler and then of Pässler and Rolly, have been universally accepted as proving that paralysis of the vasomotor center is the chief cause of death in the circulatory collapse during acute infections due to these three organisms at least, and by analogy to many others.

Our knowledge in regard to other infections has been further increased by the experiments of Raczyński and Heineke. The former of these, Raczyński, investigated the influence of the streptococcus pyogenes upon animals, and his experiments were con-

ducted exactly as were those of Romberg and Pässler. He obtained results exactly similar to those that had been obtained with the pneumococcus. The animals went into collapse and died with paralysis of the vasomotor center. The hearts were capable of responding to increased demands made upon them up to the end and the blood vessels contracted after injection of barium chlorid.

Heineke investigated the cause of death in rabbits with perforation peritonitis. Tests were made by the method of Romberg and Pässler. They showed that the heart responded admirably to abdominal massage, compression of the aorta and to the injection of barium chlorid and that the vasomotor center showed no response to any of the stimuli.

Their conclusions, which might stand for the conclusions of any of the experiments quoted, were as follows: That the cause of death is a paralysis of the centers in the medulla; that this is confined primarily to the vasomotor center and secondarily to the respiratory center; that the circulation shows striking symptoms earlier than does respiration, but that respiration ceases first; that paralysis of the vasomotor center is the cause of the circulatory symptoms, and that the heart is comparatively unaffected.

We have seen that these conclusions are applicable to infection with the diphtheria bacillus, the pneumococcus, the bacillus pyocyaneus and the streptococcus, which organisms play a most important part in infections, medical and surgical. These conclusions are also applicable to some forms of experimental peritonitis. There is, so far as I have been able to find, only one piece of work that shows any exception to the rule that experimental infections kill chiefly by vasomotor paralysis. That was done by Raczynski with the colon bacillus. He had previously experimented with the streptococcus, so there is no reason to question his methods or results, which were quite at variance with those obtained with any other organism. Instead of finding at autopsy the abdominal veins engorged with blood, he found them empty and a marked degeneration of the liver, kidney and heart. The tests showed normal response to all stimuli in the early stages of the infection, but in the stage of collapse the heart was arrhythmic and failed to react to abdominal massage or aortic compression and death apparently took place before a condition of vascular paralysis had resulted. No one is on record as having repeated or confirmed these experiments, and they stand as an exception to the rule that the other experiments established.

There has been almost no opposition to the utilization of the results obtained on animals to explain the cause of the sudden circulatory disturbances in human beings that occur in acute infections with many different organisms. The symptoms, their progression and the postmortem findings are too strikingly similar. Many clinicians, notably among them Krehl, have been loath to discard entirely the idea of cardiac weakness and have contended that the heart is still to be considered and that just as in the diphtheria experiments it shows a certain degree of failure, so actually in other infections it may be weakened; but they ascribe to the heart weakness only a secondary rôle. There is thus practical agreement that the chief cause of death is to be found in paralysis of the vasomotor center.

The comparison between the animal experiments and human patients has been made with adults. The similarity is as great with children. In them the circulatory failure comes on rapidly or slowly, but when fully developed causes pallor, cold extremities, rapid, soft pulse or its almost complete absence, with a heart whose sounds are usually clear, endeavoring by its overactivity to compensate for the emptiness of the arterial system. I have seen the heart of a child, who was pulseless, beating so tumultuously as to shake the whole precordium. The heart, too, continues to beat after the anemia of the respiratory center has caused the respirations to become shallow and irregular, and, finally, to cease altogether. The evidences of true cardiac failure, such as intense cyanosis and venous engorgement and stasis with dilatation of the heart, especially the right ventricle, are only exceptionally met with in children; they are not the rule in fatal infections.

A knowledge of the pathological physiology is a *sine qua non* of intelligent treatment and we receive incalculable assistance from this source. The condition clinically is so severe and so frequently fatal that one is unable to judge accurately of the effects of any given treatment, and thus it comes about that opinions as to the value of different drugs vary widely. We have three methods of choosing a drug. First, by its known effect upon healthy animals; second, by its effect upon diseased animals, and, third, by the results of clinical observation of diseased human beings during its use. Unfortunately these methods often do not agree, and two of them may be diametrically opposed to each other. Pässler supplied the second of these methods, the effects of drugs upon diseased animals, by numerous experiments, which seem to

point to a therapy more rational than could be indicated in any other way.

To consider first the drug around which most active warfare has been waged—alcohol.

By experiments on healthy animals it is impossible to obtain any evidence that after intravenous injection it is a cardiac or vasomotor stimulant. When given in large enough doses to produce any effect on the heart it causes a lessened efficiency and a weakness of the contractions, and it also causes an inhibitory effect, and finally a paralysis of the vasomotor center, exactly what we wish to avoid. On animals with acute infections, before the stage of collapse, Pässler found that alcohol in moderate quantities was without constant influence; it had no beneficial effect. Crile found that in shock, a condition much like that of circulatory collapse, alcohol in small doses had no effect, and in large doses increased the danger. The experience of practitioners that alcohol in septic processes is beneficial and can, to a certain extent, be utilized as a food, is entirely beside the question of circulatory collapse. From theoretical considerations and from experience with diseased animals, and I also believe from clinical observation, one can expect no beneficial effects from its use.

The use of ether as a stimulant in severe collapse is widespread. Many regard it as the strongest stimulant we possess, while others consider it practically useless. On healthy animals no favorable influence, either on the heart or vasomotor center, can be demonstrated. Pässler's results on diseased animals entirely coincide with those on healthy animals. A favorable effect on the blood pressure was not observed, rather the contrary, and when the circulation began to be affected, ether caused an immediate drop in pressure. The capacity of the heart itself to overcome increased resistance remained unchanged; the excitability of the vasomotor center was diminished. In a condition accompanied by a rapid fall of blood pressure one can only foresee danger from the exhibition of ether, and its use is absolutely contraindicated. The same may be said of the other drugs that dilate the blood vessels and lower blood pressure; nitroglycerin and the nitrites in quantities large enough to produce any results can only do harm.

With regard to strychnin, what we should expect from experiments on healthy animals fails entirely to be realized on diseased animals. Strychnin, according to Meyer and Denys, causes a rise in blood pressure by stimulation of the vasomotor center,

but Pässler found it without effect in circulatory collapse unless sufficient was given to cause convulsions, and Crile denies it any value in the treatment of the low blood pressure of shock. We can, therefore, not hope for much from strychnin; whatever beneficial effect it may have must be slight. It will, however, not act unfavorably.

Digitalis shows its chief effect in normal animals upon the heart and blood vessels and has only slight influence on the medullary center. According to Böhm and Görz digitalis induces a decided rise in blood pressure after section of the cervical cord; that is, when paralysis of the peripheral vessels has occurred. The heart, by acting more powerfully, can make up, for a time at least, for the injurious influence upon the blood pressure. From *a priori* reasoning, then, one would expect a beneficial effect only in the stage when the heart is struggling by its overexertions to compensate for the gradually widening vessels, and, indeed, Pässler found such to be the case. The blood pressure rose, but the rise was of only short duration and in the most favorable cases lasted hardly half an hour. Repeated injections had a lessened effect or none at all. Digitalis had no effect on the vasomotor center. For use on human beings in circulatory failure digitalis has the great disadvantage of slowness in action. It takes hours to manifest its effects after its exhibition by mouth, and we have no thoroughly reliable preparation for hypodermic use. If the failure is gradual in onset and we are far-sighted enough to realize that the action of digitalis will be required in the not-too-immediate future, it may assist us, but for acute collapse digitalis by mouth is valueless. It is to be considered an aid in reinforcing the action of other drugs, those that are theoretically indicated and practically of most value, the drugs that stimulate the vasomotor center.

Of the central vasomotor stimulants at present used in medicine, caffein is probably the best. The use of coffee in severe collapse has long been advocated, but its active principle has never received the appreciation in acute infections to which it is entitled. It has a marked, prolonged and constant effect in constricting the vessels by central action, and it is readily soluble. Moreover, it is a cardiac as well as a vasomotor stimulant. Pässler found that by its use slight degrees of vasomotor paralysis could be overcome for a considerable length of time, and that centers incapable of stimulation by other methods responded readily to caffein. He considers its effect more certain and more prolonged and the

remedy is much more readily administered than camphor, the other vasomotor stimulant commonly employed.

In addition to stimulating the vasomotor center by caffeine and camphor, there is another method of raising blood pressure, namely, by increasing peripheral resistance and for this are chiefly employed infusion of salt solution and the injection of adrenalin. Infusion will act only so long as the increased amount of fluid is contained in the arteries and the blood pressure sinks when the abdominal veins still further dilate. Experimentally it is of value for only a short time.

The extraordinary influence of adrenalin on the heart and peripheral vessels is well known. It would seem a drug of great usefulness, and, indeed, undoubtedly is in such conditions as collapse from chloroform, surgical shock and in infections when the heart is entirely sound; but with diseased hearts, even those that respond favorably for long periods of time to other drugs, the use of adrenalin is attended with danger. Heinz found that with animals poisoned with diphtheria toxin and with phosphorus, adrenalin caused a marked rise in blood pressure, but that the heart was so gravely affected by the increased demands made upon it that it eventually failed and the animals died before the control animals who received no adrenalin.

For many years there was no effort made to confirm the results of experiments on animals by observations on human beings. Last year, however, appeared a valuable piece of work by Sonnenkalb. He used a von Recklinghausen tonometer according to the method of v. d. Velden for estimating the functional activity of the circulation. He employed various drugs in health and disease and confirmed all of Pässler's results in acute infections. Caffein was the most valuable drug; it worked certainly, promptly, and its effects were lasting (1-3 hours). Camphor was also exceedingly valuable and was prompt but somewhat uncertain, and its effect was evanescent and was over in less than two hours. Theobromin acted like caffeine, but was less powerful and had less influence on the vessels. The nitrites and nitroglycerin had always a bad effect.

Dr. Hoobler and I have made a series of observations on children in the wards of Bellevue on the effects of drugs on the blood pressure in pneumonia. We realize, of course, that blood pressure readings do not give complete information as to the condition of the circulation, but it is the only method clinically available. We

used caffein, camphor and adrenalin intramuscularly. All three raised the pressure, adrenalin more promptly than the others, but its effect was evanescent, was over in less than half an hour, and in a few instances the subsequent fall was to a point below where the pressure had been before its use. Caffein preparations were uncertain, but with a good one the best results were obtained. The increase in pressure began in five or ten minutes, reached its maximum in the neighborhood of half an hour, and was manifest for two hours or more. Camphor also worked satisfactorily, but was not quite so certain or prolonged as caffein.

That which raised the blood pressure more certainly, constantly and satisfactorily than any drug was cold air. We noticed that when patients were brought in from the balcony, where many are kept constantly day and night, their blood pressure fell progressively during the course of the next hour and then remained at a constant level, and indefinitely until they were put out into the cold again, when the rise again occurred. The difference between the pressure indoors and out-of-doors was 10 to 15 mm. of mercury and the change always occurred. It was more marked the lower the pressure when indoors and the sicker children responded better. This cannot be the effect of more oxygen; it must be the reflex stimulation of the center due to the cold on the skin of the face and the nasal mucous membrane, and this view is further strengthened by the observation that cases of pneumonia treated out-of-doors do better in the cold months than in the warm. The importance of cold air as a tonic to the vasomotor apparatus can hardly be overemphasized, and, as I said before, its effect is certain and constant and soothing.

We see, then, that critical clinical observation and animal experimentation are in accord in referring the cause of circulatory disturbance in acute infections to a failure and final collapse of the vasomotor center. There is also almost complete agreement obtained by animal experiments and by modern methods of determining the human circulatory capacity as to the drugs and methods most useful in this circulatory disturbance.

EDUCATION OF THE CRIPPLED CHILD.*

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America has been remarkably forward in its public care for the mental and physical uplift of the normal child, and perhaps the rapidity of the advance in this respect has, through its concentration on the child in general, somewhat retarded the awakening of public conscience to its duty toward the crippled child.

In the public school, among normal children, he is at an immense disadvantage. His physical inequality and moral depression, consequent upon comparison with his more fortunate fellow, have a distinct adverse effect on his mental capacity and a tendency to lower his ultimate general efficiency.

The cripple has not had a fair or a just opportunity to work out the best that is in him; and it is for this fair chance that we are working. His full and free development is our goal.

The physical condition of the crippled child must be brought up to its highest standard, if mentally he is to be capable, if morally he is to be uplifted, and if industrially he is to add his quota to society. He must be guarded against overexertion, allowed periods of rest, and have overzealous consideration always. Medically, it must be made easy for him to secure the treatment that his condition requires, and, supplementally, it should be seen that the body is properly nourished, looking toward ultimate cure.

In the public school, difficulties are many for the cripple. He must transport himself laboriously to and from school, climb stairs, sit on benches ill-fitted to his comfort, encumbered as he is with mechanical apparatus. The discipline and uniformity of the system does not permit of due consideration. Medically, the school interferes with the proper clinical attention; or reversely, the clinic interferes with the school, and thus neither is entirely successful in its ministrations. At present it is found impossible for the public schools to take over what naturally should be parental duty, but which, through sheer inability, ignorance or indifference, is so frequently neglected, namely, the duty of providing food for the proper nourishment of the body, which, in adding

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strength to the resistance of the child, daily assists in the cure and furnishes sufficient bodily warmth so that open-air treatment may be successfully carried out.

Mentally, the care should be very different from that of the normal child in the public school. Much individual attention should be given, hence groups should be small. Classification is difficult, and demands careful thought and discrimination. The crippled child is, on the average, 2 years older than the normal when he enters school. Constant irregularities in attendance and mental variations, due to physical ups and down, make him ever a problem and candidate for new classification. Thus, it is to be seen that the instructor's work lies with the individual, and this is not practical in the public school class-room as constituted today.

Following the purely mental training of the class-room, the crippled child demands an efficient course of a practical nature. To offset his infirmity, he must be carefully prepared for some special work which he is fitted to do, so that he may maintain himself and hold self-respect throughout adult life. The normal child is equipped to fight physically, and thus to survive, if "fittest." The crippled child, being unfittest physically, must depend upon dexterity in his struggle. Through skilled industrial training we are emphasizing and developing in the cripple that quality in which he may excel, and thus diminishing in the eyes of the world and in the mind of the child himself the handicap of his infirmity. In industrial training, as in mental, the unwisdom of putting a cripple in a normal class is plainly seen. Consideration, full opportunity and individual attention are not possible; and, besides, occupations for them are of a special, adaptable type, which often could not be taught successfully in a general class.

It is easy from the foregoing to see how interactive are all of these educational factors. A combination of them results in an intense moral stimulus. The enforced introspection of the cripple makes him old before his time, makes him philosophical and thoughtful, so that he is fit soil for the germination of moral forces through the influence of these uplifting agencies. Repression, physically, mentally and industrially, bring about depression morally, because every hope is taken away. Uplift him in these respects, and you uplift him morally, give him happiness, make his aspirations higher, his accomplishments greater, and society better.

The history of the training of cripples is of too recent begin-

ning to be very extensive, but at present universal effort in this respect is being put forth. We have, as one of the earliest examples, the "Danish Clinic School and Craftsman," in the suburbs of Copenhagen, which was organized in 1874. It has a clinic which admits all classes of patients free, and supplies them with apparatus or shoes. There is a trade school for male and female, in which are taught wood-carving, wood-engraving, book-binding, brush-making, carpentry, housekeeping, dressmaking, weaving and sewing. The course is three and one-half years for males, and two years for females. In the evening there are classes in Danish, history, writing, arithmetic, drawing and modeling. The clinic maintains a shop in Copenhagen, where many of its graduates find employment, and situations are procured for the others. There is a home where the pupils live while attending the clinic and school; also, a seaside hospital for those demanding that type of treatment. In our own country the Boston Industrial School for Crippled and Deformed Children is the pioneer, having been organized in 1893. Chicago has recently opened a school of this kind. The Widener Memorial Industrial Training School for Crippled Children is working along these lines, and is wonderfully complete in its equipment; but it borders on the hospital plan, and does not rightly belong here, time will not permit of our treating of the admirable schools carried on in many hospitals for cripples, notably the Hospital for Ruptured and Crippled, which has had a school since its foundation, 1863.

New York, within the last ten years, has come to the front in an effort to give the crippled child an education which shall be broad and practical enough to make him a competent worker. It now has 11 schools for crippled children, with a seating capacity of 696. which accommodation has need to be speedily increased. We find that during the last five years the Hospital for Ruptured and Crippled has admitted to its out-patient department 18,401 new cases under fourteen years of age. Within the next five years a large proportion of this number will seek schooling, and a great many will be forced to go into the regular classes of the public schools, unless private or public philanthropy furnishes more accommodations of this special sort.

Having considered in outline the needs and wants of the crippled child educationally, let us proceed to their practical development, taking as a prototype the East Side Free School for Crippled Children, which was organized Thanksgiving Day, 1900,

with 13 children, and now has an enrollment of 183. The aim of this school from the beginning has been to advance the physical, mental, moral and industrial conditions of such unfortunate children. The physical and industrial departments are carried on by private philanthropy, the Department of Education assuming responsibility for the class-room teaching.

For the past two years the school has occupied the modern six-story building erected for it through the generosity of Mr. Emmanuel Lehman and his children. It is complete and up to date in every respect. The class and industrial rooms are large and light. There is a roof garden adapted to every season and sort of weather, a kitchen and dining-room, and a well-equipped dispensary and large elevator.

The school is divided into a kindergarten and seven special grades. The work is conducted as it is in the public schools, with special reference to the individual child. The teachers coöperate with the medical department, and are ever on the alert for over-exertion, fatigue or sign of other discomfort in any child.

The ethical development constantly follows the intellectual. The children are taught to consider each other, to be helpful, one to another, the stronger assisting the weaker in the games and tasks. Every effort is made to keep them happy, cheerful and contented. Their playground is the roof, and their games are supervised. Frequent entertainments are arranged, in which the children are encouraged to excel. Improvement in the homes is brought about by friendly visits and suggestions. Mothers' meetings are held, where instruction is given in the care of the child, with direct reference to the crippled child, and emergency aid is supplied to the families, when needed.

In the 1906 report of the Copenhagen school we read: "The close connection between clinic and school has proved to be of great benefit to the patients. It was to have been desired that other countries which have followed our example had realized this, instead of founding the school separately from the clinic." The East Side Free School has been modeled on the Copenhagen plan, and its experience concurs with these findings. Through the dispensary it has been proven to the satisfaction of those concerned that such a course is of the greatest advantage to the patient, because:—

(1) The treatment is closely followed and continuously maintained.

(2) Irregularity in therapeutic measures can be prevented, so that the child may not be obliged to suffer through lax tendency of its guardians.

(3) Fatigue and time spent in attending outside clinics are eliminated.

(4) Uninterrupted attendance upon classes is preserved.

In considering the physical care of the children it is self-evident that the transportation to and from school must be furnished on account of faulty locomotion, the danger of street crossings, and the desire for prompt attendance. Three large stages are employed in this work, each making two trips before and after school. Two able-bodied men are in charge of each wagon, to carry the children up and down stairs at their homes.

In the school rooms thorough ventilation is insisted upon as necessary for tissue upbuilding and the proper growth of the child. The windows are kept open constantly, the temperature varying in winter from 55° to 60° F.

An underfed, poorly nourished child cannot stand the fresh air without becoming chilled; but when supplied with the requisite food, fresh air is a powerful factor in the healing process. The East Side Free School for Cripples realizes that without sufficient nourishment every other element in the treatment is futile. Upon arrival and departure, each child is given bread and butter and milk, and at noon a hot dinner, consisting of meat, vegetables, bread and dessert, with special diet for those for whom it has been prescribed.

Personal hygiene is given due consideration as an agent in toning up the system, increasing the resistance against disease and for bodily comfort. Each child has two baths a week, and all are taught to care for their teeth.

The simpler forms of medication are given, and a competent medical man has them under observation. There are also in attendance a rhinologist, oculist and dermatologist. Operations for adenoids and tonsils are performed elsewhere when required.

All of the orthopedic work except the operations is done at the school. Braces are furnished and repaired; plaster of Paris bandages are applied, and carefully selected exercises of the simpler form are prescribed and given in the school-room by the teachers, under the supervision of a physical instructor specially conversant with orthopedic exercises. A trained nurse is in constant attendance, whose duty it is to readjust braces, to overlook

the orthopedic welfare of the child and to supply his immediate physical wants.

The class- and work-rooms are furnished with desks and chairs adjustable to the comfort of the individual. The health of the children is further benefited by a stay in the country during the summer vacation. Our benefactors, the Lehman family, have recently purchased land and are constructing a summer home at Oak Hurst, N. J., which will be ready for occupancy this summer, and will accommodate 100 children. Tuberculous cases remain throughout the entire summer, and the others go in relays. The school building is kept open, and the pupils in the city are taken to the roof garden for six days in every week.

Froude, in his short study, "The Essay on Progress," says: "Labor is the inevitable lot of the majority, and the best education is that which will make their labor most productive." In such a spirit was our work-room organized, and it is carried on with the idea of making it the ultimate end, the post-graduate course of every school pupil. In 1904 the work-room was open to 3 girls, to whom embroidery was taught, the average wage being \$1.75 per week. Now 12 girls are doing embroidery, fine white and fancy art work, which has a ready market, and from its sale they are paid according to their skill, the maximum wage being \$10, the minimum \$2, and the average \$4.66 per week. A book-binding and basketry shop was opened two years ago, where 8 boys work at a maximum of \$4.50 per week. The products of the workshop sold this year for \$4,309.19. Of this \$2,421.85 were paid to the workers in wages; materials having cost \$1,332.96, leaving a balance over expenditure of \$554.38. At present we have no need for other trades. The policy has been to work up to perfection those already installed, and, as more of our children at the school arrive at the working age, it will mean the enlargement of the industrial department and the broadening of its scope.

Five years ago there were 56 children on the registry, and up to the present date we have entered 297. Of the 114 who have left the school, 70 moved from the district, 14 were discharged, 12 died, 6 secured employment outside, 5 were placed in homes, 4 in hospitals, and 3 married. Of the remaining cases, 5 are cured and there are 10 whose lesions are about healed. Of these 297, 140 suffered from tuberculosis of the bone.

This work represents a clear vision of possibilities for the cripple. What has been accomplished worked itself out from day

to day, as experience indicated. It clearly points the trend such work should take, and is submitted as a suggestion for future effort. The friend of the cripple must now take up this work, and intelligently, with broad sympathy, unselfish devotion and generous coöperation, bring it to its ultimate solution.

The Board of Education is awake to its duty toward the crippled child, and is honestly putting forth every effort toward betterment in his education. It has freely coöperated with private charity, seeking in this manner to bring to the crippled advantages which under its own present plans are impracticable.

The model presented is representative of this work in the other schools. Of the 11 schools in New York City 2 are entirely under private philanthropy and 2 wholly under the Board of Education, while 7 are conducted by a combination of the Department of Education and private charity. The enrollment of the 11 schools is 632, divided into 44 classes, an average of 14 pupils per teacher. Eight of the schools have industrial departments, in which altogether 10 different trades are taught, namely:—

(1) Sewing and dressmaking. (2) Embroidery. (3) Tapestry-weaving. (4) Leather-tooling. (5) Hand-carving. (6) Making of jewelry. (7) Brass work. (8) Book-binding. (9) Basket-working. (10) Carpentry.

Of the 3 schools that have no industrial department 1 is a kindergarten of the Association for the Aid of Crippled Children. This society is generously coöperating with the Board of Education by transporting its children to one class or another in the public schools, as well as to its own kindergarten and to the Manhattan Trade School for Girls, thus manifesting its interest in the industrial training. The second is the Boat School, for tuberculous cripples, carried on by the young women of Miss Spence's School society. This is a new departure, the classes being held out-of-doors, where the rest cure is combined with their mental training. The last school is the class in the public school at Grand and Essex Streets, which has been recently organized and has an enrollment of only 12.

We can, therefore, say that the schools are practically one, as regards the realization of the value of industrial training. Having noted this common idea, we foresee that there will come a day when industrial plans and aims will be unified, each school will give and gain, and advance will be such as never before.

In all such development there are clearly indicated certain

points that must be worked out. The first is that the output must have a ready market—that is, it must be something the public wants. Second, it must compete with like products purely through merit, or, in other words, it must be as good as the best of its sort. Third, the method must be business, and not charity. So much for the product of our crippled labor. These possibilities of realization will surely be brought about.

But what of our cripple when he becomes a “master-workman,” when we can teach him no more in our industrial school! Having brought him so far, we are obliged to take him farther in order to accomplish that which we have stated as our end, namely, to give him the opportunity to become self-respecting and self-supporting throughout adult life.

Two ways to accomplish this suggest themselves:—

(1) By a special employment bureau through which his labor may be sold in the market, with the conditions, in the long run, exactly similar to those which surround any workingman; or,

(2) We, ourselves, can be his employer through a shop which shall be started on a firm business basis, having at first the backing of wealth, but which will ultimately become a self-supporting co-operative undertaking, managed by the crippled and for the crippled.

How inclusive this plan may be made and how much we might still have to depend upon the outside labor market are questions which the future will settle. At least some such plan is an ideal for us all to look forward to, think about and work for.

INTESTINAL PERFORATION DURING TYPHOID IN CHILDREN.—Jopson and Gittings (*American Journal of Medical Sciences*, November, 1909) have collected from the literature since 1903 45 cases of intestinal perforation in typhoid fever in patients under fifteen years of age. They conclude that perforation is very rare under five years of age, but that after that age it occurs about half as often as in adults. Perforation generally happens at the end of the second or during the third week. The diagnostic symptoms and signs and the technic of operation do not differ materially from those described for adults. The prognosis, however, seems to be more favorable than in adults, the mortality being somewhat less than 50 per cent.—*Boston Medical and Surgical Journal*.

A NEW SIGN IN THE RHEUMATISM OF CHILDHOOD.

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The rheumatism of childhood shares by reason of its insidious onset and never very active acute manifestations an unenviable notoriety with another acute infectious disease—tuberculosis. In both, from apparently trifling departures from health in the beginning, the full picture of disease is too often only suddenly disclosed to the discomfited clinician when permanent crippling and the irretrievable shipwreck of a young life have been brought about. In both the effects are often seen before the cause has been suspected. To the diagnosis, therefore, too many aids cannot be given.

Three years ago the writer reported in the ARCHIVES OF PEDIATRICS a series of cases of rheumatism in young children of both sexes in which he had found the thyroid gland to be enlarged. The children were of an age when metabolism was as yet unaffected by the changes incident to puberty.

In the diagnosis of the rheumatic state, the lines laid down by Cheadle in his classical Harveian lecture of 1888 were followed. Since the former communication, the writer has noticed so frequently the enlargement of the thyroid gland in the rheumatic disease of childhood that he now is emboldened to claim for it a place as a sign of rheumatism in the rheumatic series.

The time when the thyroid enlargement was first noticed varied. In some cases thyroid enlargement preceded all other manifest signs of rheumatism. Again it has appeared as the fourth or fifth link in the rheumatic chain, and at other times it has been found to persist in association with established chronic endocarditis after all other rheumatic manifestations have disappeared. The degree of enlargement of the thyroid gland, while not great, is sufficiently pronounced to give an unnatural fullness to the neck when inspected from the front. When viewed laterally the sharp contour of the gland is unmistakable.

References are few in which rheumatism and enlargement of the thyroid gland are mentioned in relationship as cause and effect respectively, and in them the nature of the enlargement was exophthalmic.

N. M. Ord¹ states that quinsy, rheumatism and a tendency to bleeding, especially in the form of epistaxis, have been observed as antecedents in a significant number of cases. C. O. Hawthorn² narrates a case of Graves' disease in a patient, the subject of articular rheumatism and mitral stenosis. A Weil³ writes under the caption, "Goitre Exophthalmique et Rheumatisme," Sir Samuel West⁴ gives the history of 2 cases of exophthalmic goitre in sisters with morbus cordis and a rheumatic history. Under treatment, Chibret⁵ discovers his suspicion of rheumatic antecedents by using salicylate of soda in the treatment of exophthalmic goitre.

Inasmuch as the secondary forms of exophthalmic goitre are etiologically descended from and engrafted on the ordinary bronchocele, the references above have a possible significance as establishing a relationship between ordinary goitre and rheumatism.

In a child with enlargement of the thyroid gland a careful past history should be taken, with especial reference to growing pains, torticollis, stiff hamstrings and recurrent attacks of tonsillitis. The family history as regards rheumatism should be inquired into. A careful physical examination of the heart should be made and signs of chorea sought for.

F. Müller⁶ records a case of acute exophthalmic goitre of six weeks' duration in a girl ten years of age, in whom the symptoms were extreme awkwardness of the hands, frequent vomiting, lassitude and pains over all the body, followed by slight exophthalmos and swelling of the thyroid gland. It is possible another interpretation of symptoms might be made.

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MENINGITIS COMPLICATING PNEUMONIA, WITH A REPORT OF CASES.*

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Pneumonia, with cerebral symptoms, is quite common in children, particularly in the beginning of the disease. Formerly, it was thought that meningeal symptoms were associated with apical pneumonia only. This has been denied by careful observers. It is not likely that the initial cerebral symptoms are due to the effect of pneumococci, or their toxins, on the central nervous system, because the cerebral symptoms are only introductory, which, in the majority of cases, disappear when the physical signs in the lungs become evident.

It may perhaps be attributed to the rapid rise and continued high temperature which causes a hyperemia of the brain. Convulsions, also, may develop in this manner in case of special predisposition, as it is common in neurotic families. To cite an instance: I have had a family under my care where both parents were very nervous, and whenever any of their children had a severe illness it was preceded by convulsions.

Fraenkel's diplococcus is not the cause of croupous pneumonia only, but its domain is more extensive. It may at times travel to other regions and cause pleurisy, pericarditis, endocarditis, peritonitis and nephritis. It invades, also, the joints, middle ear or the parotids—lastly, the meninges.

In this clinical report from the Children's Department of the Beth Israel Hospital (service of Dr. Francis Huber), I shall describe 3 cases which were observed by us in the course of two years. Two of these were due to pneumococci, which were found in the fluid obtained by lumbar puncture. In one case we found the Friedlander's bacillus in the cerebrospinal fluid. All the patients succumbed to this disease.

CASE I. Child, Mollie G., eleven months old, was admitted to the Beth Israel Hospital on June 5, 1908, with the following history: The child was perfectly well until sixteen days ago, when she suddenly became ill with a severe attack of pneumonia and

* Read before the Eastern Medical Society of the City of New York, February 11, 1910.

marked nervous symptoms. She was treated by a competent physician and made a complete recovery on the tenth day. The next day she had a relapse with high temperature, frequent respiration, unconsciousness, restlessness, an upward rolling of the eyes, and rigidity of the neck, back and extremities.

The symptoms persisted until admission, when we found the child in a marked prostration with distinct symptoms of lobar pneumonia at the right upper lobe, anteriorly and posteriorly. The temperature was 104°F.; pulse, 140; respiration, 52. Ears and mastoids were negative, pupils reacted sluggishly to light, and there were no changes in the fundus of the eyes. Reflexes were exaggerated. There was marked rigidity of the neck, and the entire voluntary muscular system was in a state of spasm.

A lumbar puncture was made on the following day, and 4 c.c. of turbid fluid under tension was obtained. The fluid was examined by Dr. Singer, the house physician, and he found distinct pneumococci present. The pneumonia and meningeal symptoms persisted during the next three days. On the fourth day the child began to have clonic convulsions at regular intervals, which lasted until the following morning. They were more marked on the left side of the body. The child did not respond to any treatment, gradually sank, and died on the twenty-third day of her illness. No autopsy was obtained.

Case II. Child, Frank T., eighteen months of age, was admitted to the hospital on June 18, 1909. The family history was negative. Six weeks before admission the child had an attack of measles and bronchitis, from which it recovered completely. The present illness began four days before admission, with fever, vomiting and anorexia. There were marked nervous symptoms, staring of the eyes, strabismus and listlessness. On the evening before his admission the child had spasm of the lower jaw and feeding became an impossibility. On the following morning he had a severe attack of convulsions, which was more marked on the right side.

On June 19th the condition of the child was very poor; there was marked dyspnea and cyanosis. The fontanels were bulging, the pupils were dilated and reacted to light. On physical examination there was found an area of marked dullness of the right lung at the apex, distinct bronchial breathing, and numerous subcrepitant râles. The liver and spleen were somewhat enlarged. There was marked tache present. The child had clonic convul-

sions on the right side, the face, and the upper and lower extremities. Ears were normal; respirations labored. The temperature during the day was ranging from 100.5° to 103° F.; pulse, 160; respiration, 60. A lumbar puncture was made and 10 c.c. of thick pus was obtained. The fluid was examined by the pathologist of the Beth Israel Hospital, Dr. Eli Moschcowitz, and diplococcus pneumoniae was found. The child vomited several times during the day, he was unable to swallow, and had to be fed by gavage. He had twitchings and occasional rigidity of the entire body, and there was some stiffness of the neck. The hands and feet became cyanosed, and the pulse was not perceptible. The child died during the evening of the sixth day of his illness.

CASE III. David B., two and one-half years of age, was admitted July 8, 1908. Family history was negative. The child had scarlet fever six months ago, and pneumonia three months ago. He was well until seven days before admission, when he became ill with fever, vomiting and dyspnea; later he became extremely apathetic.

On July 9th there was some dyspnea, the cheeks were flushed, there was some herpes labialis present. The eyes, nose and ears were negative. The submaxillary, axillary and inguinal glands were enlarged. Posteriorly, there were signs of complete consolidation of the right, middle and lower lobes. The liver was slightly enlarged, and the spleen was not palpable. The reflexes were normal. Temperature, 103.5° F.; pulse, 140; respiration, 50.

On July 10th the child's body became rigid; at times he was very restless, also dull and drowsy. He took very little nourishment. During the next three days his nervous condition became worse, and there was a general rigidity of the entire body. A lumbar puncture was made and 12 c.c. of slightly cloudy fluid was obtained under pressure. The urine was negative. A second lumbar puncture was made and 8 c.c. of cloudy fluid was obtained. Both specimens were examined by the bacteriologist of the hospital, Dr. Hertz, and he found Friedlander's bacilli in the second specimen.

Ophthalmic reaction with tuberculin and Von Pirquet test were negative. Blood count showed 3,500,000 red corpuscles; hemoglobin, 70 per cent.; 15,000 white blood corpuscles; small mononuclear, 20 per cent.; large mononuclear, 6 per cent.; polynuclear neutrophile, 70 per cent.; eosinophile myelocytes, 1 per cent.

From July 15th to 17th the temperature was ranging between 100° and 104° F., the respiration was between 40 and 106, the pulse from 120 to 160. The twitching, rigidity, apathy, and anorexia continued. He coughed frequently, vomited a number of times, and screamed sharply while sleeping. A third lumbar puncture was made and 8 c.c. of fluid was obtained under pressure; he apparently improved, taking some nourishment.

On July 18th the temperature was 101.8°F.; pulse, 146; respiration, 70. The child had nine convulsive attacks, each lasting from three to seven minutes, which were controlled by chloroform. The pulse became weak and irregular, the face was cyanosed, the twitchings of the extremities continued, and the pupils still responded to light. The child was restless all night, and responded to no treatment. Toward evening the child constantly rolled its eyes upward, biting its tongue, and there was marked rigidity of the body. The temperature was 105.2°F.; respiration, 80; the pulse could not be counted. The child died on the seventeenth day of its illness. No autopsy was obtained.

Judging from our experience, and from the cases recorded by careful observers, it seems pneumococcic meningitis in early childhood is, as a rule, fatal.

Meningitis as a complication of pneumonia has been emphasized by a great number of careful clinicians. Drs. Musser and Morris (*Osler's Modern Medicine*) say that among 49,028 clinical cases collected, meningitis occurred in 206 (0.24 per cent.), and on autopsy, out of 4,833 cases, in 180 (3.5 per cent.).

In 1866 and 1868 Immerman and Heller, from Erlangen (*Deutsch. Archiv. für Klin. Med.*, Bd. 5), claimed that they found in autopsies made on 30 cases of pneumonia 9 cases of suppurative meningitis. (Almost one-third.)

Hugo Meyer (from the Pathological Institute of Dorpat, 1887) found 5 cases out of 11 autopsies.

Dr. Holt (*ARCHIVES OF PEDIATRICS*, Vol. X., p. 1,012, 1893) states that in 500 cases of acute pneumonia he observed only 4 cases complicated with meningitis. (Less than 1 per cent.)

Dr. Osler (*Modern Medicine*, Vol. II.) says that he found 8 per cent. of the fatal cases which he observed in the Montreal Hospital had this complication.

Dr. E. Aufrecht (*Nothnagel's Practice, Diseases of Lungs*) claims that in 253 autopsies he found meningitis but seven times; besides this he has noted meningitis three times as a complication

in pneumonia, in patients who recovered. In 1,501 cases there were but 10 cases of meningitis. (0.66 per cent.)

Dr. E. Otten (*Jahr. für Kinderhk.*, Berlin, May, 1909, Vol. LXIX.), reviews his experience in 250 cases of croupous pneumonia in children since 1897; 34 of the cases had brain symptoms during the course of the disease, such as unconsciousness, delirium, hyperesthesia, stiff-neck, etc. Spinal puncture was made use of. Pneumococci were found in the blood in nine of the seventy children thus examined and five of the nine succumbed to the disease. Two of these children died of suppurative meningitis. (0.8 per cent.)

In the Beth Israel Hospital, Dr. Huber's service from October, 1907, to October, 1909, we have had 180 cases of lobar pneumonia; 6 of these died from meningitis complicating pneumonia. (3.3 per cent.)

Dr. G. Liebmester, of Köln (*Münch. Med. Woch.*, April 13, 1909), made special examinations of the spinal cord in 11 cases (ages between forty-one and seventy-two years), and records that changes of characteristic inflammation of the meninges were found in one-third of the cases examined, and, clinically, often no symptoms were observed. Macroscopically, no changes were seen. It was only by careful histological study that the meningitis was discovered.

Dr. Churchill (*ARCHIVES OF PEDIATRICS*, Vol. XXIV., p. 891, 1907) claims that next to the frequency of the meningococcus as a cause of pneumonia comes pneumococcus. From all the cases of meningitis collected, he found that 10 per cent. were due to pneumococci.

A general pneumococcus infection has been demonstrated by a great number of bacteriologists. Dr. Trochaska (*Deutsch. Archiv. für Klin. Med.*, Bd. LXX., p. 559) examined, bacteriologically, the blood of 40 consecutive cases of pneumonia, of which 7 were fatal. In 38 instances pneumococci were found. Dr. Ewing (*Osler's Modern Medicine*, 1902) gives a total of 348 cases of pneumonia, in 160 of which the pneumococcus was isolated from the blood.

Dr. Wiens (*Zeit. für Klin. Med.*, 1908, Vol. LXV., p. 53) gives an observation made by thirteen careful investigators, from 1900 to 1908, here and abroad, a total of 968 cases of pneumonia, in which the blood was invaded by pneumococci in 422 cases.

Of 39 cases examined by Dr. Wiens himself, 22 showed the

presence of pneumococci in the blood. He draws the following conclusions: First, bacteriemia in croupous pneumonia is almost a constant occurrence. Second, in central and atypical cases of pneumonia, blood cultures would be an aid in the diagnosis. Third, the fact that bacteria are found in the blood does not prove that the disease is bound to take a fatal course. Still, when the specimen is rich in bacteria, it makes the prognosis somewhat unfavorable. He also claims that pneumococci were found twenty-four hours, and over, after the crisis.

In view of the facts mentioned above, it is rather surprising that more cases of meningitis complicating pneumonia in children have not been recorded. Possibly some of the patients who succumbed were not carefully examined for meningeal complications, as the entire attention has been as a rule directed to the lungs, and not to the spinal cord and meninges, therefore some important pathologic and histologic changes have been overlooked.

It would throw more light on the subject of meningeal pneumonia if a more thorough examination were made of the spine, reflexes and eyes, as well as the lungs. Special attention should be given to the blood cultures also, and to the examination of the cerebrospinal fluid.

139 Henry Street.

HEMORRHOIDS IN CHILDREN.—Karnitzki (*Russki Wratsch*, No. 49, 1908; *Centralbl. für Chirurgie*, No. 15, 1909). The case observed by the author concerned a girl three years of age, who had four hemorrhoidal nodules at the anus, one of which attained the size of a walnut under straining at stool. Pains were present on defecation, but no hemorrhage was noted. Among about 2,500 cases of hemorrhoids, collected from the literature, 115 (4.6 per cent.) concerned children; 14 up to the age of five years, 4 from five to ten years, 9 from ten to fifteen years, and 88 from fifteen to twenty years. The disease is accordingly rare in children. The author admits two anatomophysiological groups, congenital (anomalies of development) and acquired. The more frequent occurrence of hemorrhoids after the age of fifteen years is due to the increase of the blood pressure at this age, when the heart and the vascular system are put under a greater functional strain.—F. R.—*Medical Review of Reviews*.

CLINICAL MEMORANDA.

CASE OF CEREBRAL HEMORRHAGE IN THE NEWBORN. DELIVERED BY OPERATION.*

BY FRED T. MURPHY, M.D.,

AND

JAMES R. TORBERT, M.D.,

Boston, Mass.

At the meeting of the Pediatric Society, January 23, 1910, one of us, Dr. Torbert, presented a paper entitled "Cerebral Hemorrhage in the Newborn." In the paper and in the discussion which followed operation in selected cases was recommended as the only hope. In the discussion the feasibility of operation on these young children was questioned and the opinion was expressed that manipulation of the soft fetal brain was an impossibility. The present case is reported partly to meet the objections made in the discussion and to put on record another case in which operation relieved the intracranial tension and led to the recovery of the patient.

Mrs. M., a primipara, entered the Boston Lying-in Hospital June 3, 1909. She had been in slight labor for twenty-four hours, and after four hours of good hard labor in the hospital, delivery was decided upon by Dr. Torbert on account of lack of progress and a rising fetal heart. The position was a breech and the delivery fairly difficult, owing to the fact that she was not fully dilated at the time of delivery. The baby cried at once, being born at 6:30 P.M. It had a restless night, crying continually, with a short, sharp cry. In the morning the infant showed a left arm paralysis, also a slight facial on the same side. The anterior fontanel was tense and bulging. A diagnosis of intracranial hemorrhage was made, permission for operation obtained, and the baby transferred to the Infants' Hospital.

Entered the Infants' Hospital at 3:30 P.M., June 4, 1909. Pulse 140, respiration 48, temperature 98.6. Pupils equal. General physical as above. Infant noisy when awake. Had convul-

* Read before the New England Pediatric Society, March 26, 1910.

sive movements of the face and periods of cyanosis, also periods of twitching of all the extremities, lasting one-quarter of a minute. Swallowing was difficult; urine was voided. At 9 P.M. there was general twitching during the examination. Lumbar puncture gave 2 drams of almost pure blood.

9:30. Operation by Dr. Murphy. Child carefully protected against loss of heat. Very slight etherization. A large horse-shoe flap made to include the parietal bone was turned down on the right side. On exposing the anterior fontanel hemorrhage on either side could be demonstrated through the dura. Parietal bone in part on the right elevated and turned down as an osteoplastic flap. On opening the dura the blood spurted out to the height of several inches. Dural opening enlarged. The whole right hemisphere was irrigated. The blood clotted very little. While the relief of tension had been marked there was still considerable bulging of the brain substance. No definite point of hemorrhage found. The anterior fontanel to the left of the median line was then opened for about an inch. A considerable quantity of fluid blood, but much less than on the right side, was discharged. This reduced the intracranial tension to within normal limits. As the condition of the child was poor the left hemisphere was not exposed. The dura was roughly sutured. The bone flap held in position by a few sutures and the scalp carefully approximated.

Condition at the end of operation fair.

12:15 A.M. Infant restless, slight convulsions, twitching of both sides.

3 A.M. Loud, sharp cry, followed by twitching of extremities. Infant sleeps a few minutes, waking suddenly and crying out sharply, then twitching both sides of the body. The pulse is bad during these attacks, but better during quiet periods. This condition continued all night.

Treatment.—Strych. sul. gr. $\frac{1}{300}$ s.c. every four hours.

Salt solution, 1 oz., every four hours, s.c. It absorbed this well and swallowed easily and seems hungry.

June 5, 1909. Right-sided twitching all day, left side quiet. Cries out as if in pain. Takes food well and retains it. Fed with dropper. Is getting whey, 2 drams every hour, brandy, 3 gtt. every four hours in a dram of water. At night the food was strengthened to a 2.00-5.00-.25, .25 and strychnin omitted.

June 6, 1909. Salt solution omitted at 5 P.M. Had a severe convulsion, at 6 another, and condition poor.

June 7, 1909. The infant had a good night and day. No further convulsions. Still frequent twitching of extremities, more marked on the left.

June 12, 1909. No convulsions for five days. No twitching for three days. Takes food well from bottle. Discharged back to Boston Lying-in Hospital for breast feeding in good condition.

- June 12-18, 1909. Remained at the Lying-in Hospital. Took breast feeding normally and seemed in every way a normal child.

June 18, 1909. Discharged to St. Mary's Infant Asylum.

At St. Mary's Asylum the child at first seemed to thrive. There were at the time several cases of enteritis and early in July this child had a gastroenteric upset and died July 9th. The cerebral condition was considered by those in attendance to be normal.

A CASE OF CONGENITAL MYOTONIA.

BY HUGH T. ASHBY, B.A., M.B., M.R.C.P.,

Manchester, England.

Having seen a case of the above disease described in the ARCHIVES OF PEDIATRICS (January, 1910), by Dr. Schlivek, it may be of interest to report a somewhat similar case occurring in the Manchester Children's Hospital, England.

The case was a girl, aged eight years, who was admitted into the hospital last September. The family history and the history of previous illnesses unimportant. The present condition dates from birth, and the mother said she was fairly intelligent, mentally, and took an interest in things going on around her. On examination the child was of normal stature, but lay in bed almost completely paralyzed, and as the child was abnormally shy it took some days before her confidence could be gained and the true state of affairs reached. All the muscles of the body were extremely flabby and wasted, including the muscles of the face, which gave her very little expression. She could just move her limbs, but with very little power, and she could not even raise herself to a sitting position without help. She had to be fed and there was some difficulty in masticating solid food. The sensory system was normal, both subjective and objective, and there were no tremor, spasm or ataxia. The reflexes were for the most part

absent or very feeble, but the extreme wasting of the muscles would account for this. The electrical reactions were normal, and there was no reaction of degeneration; the electrical reaction peculiar to that found in myotonia congenita (Thomsen's disease) was not present. The mental condition was impaired somewhat, but all the special senses were normal, including the bladder and rectum. The bony system was well developed and normal. In coming to a diagnosis every system seemed normal except the muscular system, and the only disease fitting in with the case is congenital myotonia or Oppenheim's disease. In this disease, however, the muscles supplied by the cranial nerves generally escape, which, however, in the above case were atrophied like those of the rest of the body. The above case differs from congenital myotonia or Thomsen's disease in that there is no stiffness at the commencement of a muscular movement which passes off as the movement continues, and also the electrical condition peculiar to the latter disease was absent. After four months' treatment in hospital her general condition slightly improved, especially mentally, when she became more accustomed to her surroundings. She can now just raise herself to a sitting position, but the rest of her muscles remain as before.

I am indebted to Dr. H. R. Hutton, senior physician to the Manchester Children's Hospital, for permission to publish the case.

INTENSIVE SEROTHERAPY IN THE TREATMENT OF SEVERE ANGINA AND DIPHTHERITIC PARALYSIS.—H. Méry, B. Weill-Hallé, and Parturier (*Archiv. de Méd. des Enfants*, September, 1909) describe their technic in the use of antitoxin in large and repeated doses to prevent and to cure diphtheritic paralysis and in the treatment of very severe sore throats of diphtheritic origin. They increased the size of the doses used during the acute stage of the disease, and continued them after the false membrane had fallen from the throat. After beginning this treatment they lost no case of malignant angina, nor did any die of paralytic syncope. No albuminuria was caused by these large doses. Anaphylactic symptoms result rather from small than large doses of serum. The use of serum systematically in convalescence from these throats will result in an absolutely preventive action.—*American Journal of Obstetrics.*

MISCELLANEOUS.

ASSOCIATION OF AMERICAN TEACHERS OF THE DISEASES OF CHILDREN.

Programme of the Fourth Annual Meeting, 1910.

9:30 A.M., MONDAY, JUNE 6TH.

SOUTHERN HOTEL, ST. LOUIS, MISSOURI.

OFFICERS AND MEMBERS OF THE SENATE:

Alfred C. Cotton, President, Chicago; Richard B. Gilbert, Vice-President, Louisville; Samuel W. Kelly, Secretary, Cleveland; George H. Cattermole, Treasurer, Boulder.

W. C. Hollopeter, Philadelphia; J. Ross Snyder, Birmingham; W. W. Butterworth, New Orleans.

FIRST SESSION.

MUSIC ROOM.

SOUTHERN HOTEL AT 9:30 A.M.

Call to order and reading of minutes.

Reports of Senate, Secretary, Treasurer and Standing Committees.
Unfinished business.

New business.

President's Announcement of Nominating Committee.

Appointment of Auditing Committee.

Report of the Committee to the Council on Medical Education of
the A. M. A. Dr. Alfred C. Cotton, Chicago.

Reports of the Committee to the Associations of State Examining
and Licensing Boards.

Dr. William C. Hollopeter, Philadelphia.

Report of the Committee to the Association of American Medical
Colleges. Dr. Samuel W. Kelly, Cleveland.

Address of the President.

Dr. Alfred C. Cotton, Professor of Diseases of Children,
Rush Medical College, Chicago.

"The Advantages of Specializing in Pediatric Practice."

Dr. Harry M. McClanahan, Professor of Pediatrics,
University of Nebraska, Omaha.

"The Teaching of the Surgical Diseases of Children."

Dr. Edward J. Wynkoop, Associate Professor of Pediatrics,
College of Medicine, Syracuse University,
Syracuse.

SYMPOSIUM ON THE TEACHING OF PEDIATRICS.

(Five to ten minute papers.)

- (1) "Should the Special Anatomy of the Infant and Child be Taught in the Department of Pediatrics or in the Anatomical Department?"

Dr. William W. Butterworth, New Orleans.

- (2) "How Much Time and Attention Should be Given to Teaching the Physiology and Hygiene of Infancy and Childhood."

Dr. William J. Butler, Chicago.

- (3) "In What Department and by Whom Should the Surgical Diseases of Children be Taught?"

Dr. Samuel W. Kelley, Cleveland.

- (4) "Of What Value is the Lecture in the Teaching of Pediatrics?"

Dr. Edwin W. Mitchell, Cincinnati.

- (5) "The Value of the Dispensary or Out-patient Department to the Student of Pediatrics."

Dr. Henry Jenkins, Cleveland.

- (6) "Practical Methods of Securing Clinical Teaching of the Contagious Diseases."

Dr. Frank H. Lamb, Cincinnati.

- (7) "On the Instruction of Students in the Practical Work of Preparing Foods and Administering Them to Infants and Children."

Dr. J. Warren Van Derslice, Chicago.

- (8) "The Milk Laboratory as a Teaching Factor."

Dr. Henry W. Cheney, Chicago.

- (9) "Observations on Teaching Pediatrics to Post-graduates."

Dr. Godfrey R. Pisek, New York.

SECOND SESSION.

CLINICAL AMPHITHEATRE, UNIVERSITY HOSPITAL,

JEFFERSON AND LUCAS AVENUE, AT 2 P.M.

"Pediatric Teaching in St. Louis University." Dr. J. R. Clemens.

"Pediatric Teaching at Washington University."

Dr. George M. Tuttle.

Discussion of all the Papers on Teaching.

PRESENTATION OF INTERESTING CASES BY THE

ST. LOUIS MEMBERS.

"Anterior Poliomyelitis and Cerebral Palsy."

Dr. Josephine Young, Chicago.

"Scarlet Fever."

Dr. J. Finley Bell, Visiting Physician, Englewood Hospital, Englewood, N. J.

"Studies in Diabetes in Children."

Dr. Isaac A. Abt, Professor of Pediatrics, Northwestern University, Chicago.

THIRD SESSION.

MUSIC ROOM.

SOUTHERN HOTEL AT 8 P.M.

"Recent Progress in Physiological Chemistry of Infants."

Dr. John Zahorsky, Clinical Professor of Diseases of Children, Washington University, St. Louis.

"Purpura."

Dr. Theodore J. Elterich, Professor Diseases of Children, Western Pennsylvania Medical College, Pittsburg.

(1) "Some Results of Infant Feeding with Milk from City-kept Cows."

(2) "A Study of Breast-feeding in the First Two Weeks of Life."

Dr. Effa V. Davis, Superintendent of Chicago Maternity Hospital and Training School for Infants' Nurses, Chicago.

"Method of Feeding of More Importance than Choice of Food, in Substitute Feeding of Infants."

Dr. Charles Douglas, Professor of Diseases of Children, Detroit College of Medicine, Detroit.

SOCIETY REPORTS.

THE NEW YORK ACADEMY OF MEDICINE.—SECTION ON PEDIATRICS.

Clinical Meeting, Held April 14, 1910.

DR. ELI LONG, CHAIRMAN.

A CASE FOR DIAGNOSIS.

DR. MARY SUTTON MACY presented a child, fourteen months old, who was first seen by her at the Gouverneur clinic yesterday. The baby was the first-born and was delivered spontaneously. Over the bridge of the nose was a tumor which had existed since birth. It pulsed freely and when the child cried became reduced in size. A tentative diagnosis had been made of hernia of the frontal sinus, or a meningocele, or a pulsating angioma. The tumor was reducible by pressure.

DR. WARD BRYANT HOAG said he had seen an exactly similar case at the New York Polyclinic. It occupied a similar situation, had the same characteristics, could be made to disappear on pressure, and there was an absence of bone. It appeared in Dr. Kerley's service and they concluded that it was a meningocele.

DR. L. PIERCE CLARK said that his experience with these cases was very limited, he having seen but 2 or 3 cases, and they were all older children. No one had undertaken to close the opening between the bones. The results of surgery in these cases had been unsatisfactory and unfortunate, because of the danger of infection and because these patients did not stand operations well. He thought the case presented by Dr. Macy was very interesting and unique.

DR. HENRY W. FRAUENTHAL believed this to be a case of meningocele. The X-ray, however, would aid them greatly in making a diagnosis.

DR. L. PIERCE CLARK expressed surprise that this meningocele disappeared in greater part when the child cried; the contrary was usually the case. The tense muscular action of the pyramidalis nasi did not seem to be of sufficient compressive power to account for the disappearance when the child cried. The condition here was the same as in spina bifida, and a similar operation of laying open the sac and closing the communication with the cranial cavity might be undertaken; a retaining plate might be made for the bone defect at the cranial opening. Treatment

by injection of these meningoceles with iodine or its compounds was uncertain of good results. One should always bear in mind that these cases do poorly under any form of surgical manipulation.

A CRETIN SIX MONTHS OF AGE.

DR. WARD BRYANT HOAG presented this patient. The family history had no bearing on the case. The child was six months old and was seen by him March 28th. The child was born at full term; it was a head presentation and a very difficult labor; not only was the delivery of the head difficult, but of the shoulders as well. Instruments were used. An interesting question arose in this case as to the influence of the excessive traumatism on the body, or the force exerted upon the neck in destroying the substance of the thyroid gland. When the baby was two or three months old it began to lose weight. When he saw the child on March 28 it weighed 11 pounds and 6 ounces. The mother supposed it was a hopeless idiot and brought the child to the hospital because of an umbilical hernia. The child had a shock of coarse hair, a broad nose, the mouth characteristic of a cretin, but the tongue did not protrude. The long bones, especially the humerus and femur, were shortened. The skin was cool. There was the broadened hand and shortened fingers held in the characteristic fashion.

The baby was placed on $\frac{1}{4}$ grain of thyroid extract, which was equivalent to $1\frac{1}{4}$ grains of the fresh gland, twice a day. At the end of one week the child nursed better and was warmer, although he lost $\frac{3}{4}$ of a pound in weight. He was then given $\frac{1}{4}$ grain of thyroid extract three times a day, and during the next seven days he gained $\frac{1}{2}$ pound. There had been a slow but gradual improvement.

DR. GODFREY R. PISEK said there was no doubt about this case being a true cretin, for the picture was so typical. The interesting point was the early months in which the diagnosis was made. It was very difficult to make a differential diagnosis at this early time of life between a cretin and a Mongolian idiot.

DR. ELI LONG said the youngest cretin he had ever seen was eleven months old. The child was brought to the clinic because the mother stated that it never cried. The trouble had not been suspected. When the photograph was taken it practically made the diagnosis. The oldest cretin he ever saw was a man twenty-three years old.

DR. CHARLES HERRMAN recalled a case he had seen recently in which there were one or two features worthy of note. When the patient was given thyroid extract the hair fell out, but eventually he got a new crop of hair. The palms of the hands and the soles of the feet peeled as extensively as though the patient was desquamating after a severe attack of scarlet fever. Especial emphasis should be laid upon the institution of early treatment in these cases, for the results are then so much more favorable. These patients never attain a normal intelligence.

DR. L. PIERCE CLARK said the paramount interest in cretin therapy was the effort toward successful thyroid body transplantation. Certain experiments upon animals had shown that it was possible to obtain a functioning implanted thyroid. Now that arterial anastomosis was becoming more practical it seemed reasonable to look forward to a more hopeful future for these cretins. It was certainly but a therapeutic aggravation to rely upon thyroid feeding for a certain number of years, and then, on its withdrawal, to see the cretins not only relapse, but rapidly become worse than before therapy was undertaken. It is a fact not sufficiently impressed on the clinical mind that cretinism *per se* has but little or nothing to do with idiocy as ordinarily understood as a permanent defect of mind. No special therapy could improve the mental outlook of an idiot. The type here shown might more properly be called cretinoid, inasmuch as it occurs as a sporadic case and lacks the intensity of coarseness and stupidity of the endemic cretinism of Switzerland.

CASES OF HEAD NODDING IN COLORED CHILDREN.

DR. CHARLES HERRMAN presented 5 children treated in Dr. La F  tra's service at the Vanderbilt Clinic. One was a boy four years old; he had been treated at the clinic for head nodding when six months old; it had disappeared and reappeared two months ago. It was very unusual to see the condition in a child four years old.

The most interesting point regarding these cases was the etiology. By some rickets was supposed to play an important part. The patients presented all had rickets, but, as a matter of fact, practically all the colored children brought to the Vanderbilt Clinic showed signs of this disease. He had seen patients with head nodding who had no signs of rickets. It was not essential. The eruption of teeth was considered by some an important etiologic factor. The movements of the head were sometimes

more marked when dentition was difficult; and Dr. Herrman was inclined to think that this was due to the fact that at such times the children were restless and slept less. Such movements are frequently more pronounced when the patients are fatigued.

With regard to traumatism as a causative agent, few of the cases gave a clear history of a fall; if it occurred it was probably the result of incoördination as part of the disease already existing.

Much stress had been laid upon a theory proposed by Raudnitz some years ago. He investigated a number of these patients and found that nearly all lived in dark rooms artificially lighted. He concluded that the head movements and nystagmus were caused by an attempt on the part of the infant to fix objects but dimly lighted. Some years ago Dr. Herrman had collected and visited the homes of 20 cases which occurred in Dr. Koplik's service at the Good Samaritan Dispensary. Only one-half lived in dark rooms. This, therefore, could not be the sole cause. Raudnitz had compared the nystagmus to that occurring in miners; but it had recently been shown that here, too, darkness was not the only factor. The nystagmus occurred almost exclusively in coal miners, and it did not occur in all persons working in darkness—for example, in those working in the manufacture of photographic material. The most plausible theory seemed to be that it was caused by the long-continued rhythmic movements of the pick in comparative darkness.

Dr. Herrman was inclined to believe that the head movements with nystagmus in infants was a coördination neurosis to which certain children were predisposed. A certain stage in the development of the nervous system was an essential factor, as shown by the age incidence. There was some disturbance in the nervous mechanism which controlled the associated movements of the head and eyes. The nystagmus was often unilateral; even if bilateral it was usually more marked in one eye. This was difficult to explain if it was due simply to fatigue of the eye muscles.

These children had a peculiar way of "cocking the head," holding it to one side and looking out of the corners of the eyes, and this was so characteristic that it might almost be considered pathognomonic. They probably assumed this position of the head in order to get the image of the object focussed on a certain portion of the retina. In answer to a question, Dr. Herrman stated that errors of refraction and astigmatism were not present; vision was normal.

With regard to treatment, bromides had little or no effect. The children should live out of doors as much as possible.

DR. L. PIERCE CLARK said that inasmuch as nodding spasm of the type shown occurred only in infancy and all cases recovered, we should look for its real cause in a retarded anatomic development in the bulb mechanism of coördination of head or eye movement. It was reasonable to suppose that there is retarded development, a lack, perhaps, of myelinizations of nerve fibers in the great coördination tract of the posterior longitudinal bundles in the medulla, thus giving rise to the functional imperfections seen in nodding spasm. Its frequent association with other disorders of maldevelopment, such as rickets and the like, would help on this hypothesis. The partial recurrence of the head movement in the eldest child caused by fright might be looked upon as a choreiform disorder induced in a congenitally weak coördination mechanism. It would be interesting to note whether infants once affected with nodding spasm more commonly develop chorea later in life. This observation would be doubly interesting in this instance, as all the children shown here are from the colored race, one commonly supposed to be infrequently attacked by chorea.

A CASE OF ENDOCARDITIS ACQUIRED AT SIXTEEN MONTHS OF AGE.

DR. WARD BRYANT HOAG presented a girl eight years old. From sixteen to twenty months of age she was very ill most of this time. It was then noticed that her heart beat very forcibly and she was taken to a doctor. She was very short of breath, had moist râles in her chest, a certain amount of edema of the lungs, and she could scarcely walk across the floor. At present her fingers were not clubbed, she was now not suffering from any shortness of breath, and she was having a good time generally. A loud thrill was heard over the heart, there was but little hypertrophy, the apex being very near the normal point.

DR. ROWLAND G. FREEMAN believed this to be a case of congenital heart disease, which had not caused any manifestations until the child had become sick.

DR. WILLIAM P. NORTHRUP said that there was no doubt in his mind but that this was a case of congenital heart disease; it had all the characteristics of it, with all the signs but the cyanosis. He had made autopsies upon 9 similar cases, three of which had been under observation at the Foundling Hospital. In each case

there was a narrowing of the pulmonary orifice with a defective septum ventriculorum.

FRIEDRICH'S ATAXIA: TWO CASES.

DR. EDWARD LIVINGSTON HUNT presented 2 patients, sisters, daughters of Russians. The mother had three brothers and sisters, and the father was one of nine children. All had lived mostly out of doors. The ages of these two daughters was eleven and three and a half years. The history of the pregnancy and labor was absolutely normal in each case. There was no history of tuberculosis, alcoholism or syphilis. The older child began to walk late and since the age of about five years walked with difficulty, which difficulty in walking had greatly increased and now she could not walk alone. There were no knee-jerks. There was a lateral curvature of the spine. She had very marked choreiform movements. She had no nystagmus. The younger child began to have difficulty in walking a few months ago, and this was the only symptom present. The unusual feature in this case was the early age at which the disease appeared; when two and a half years of age she developed ataxia. The mentality of both children was very good. In the older child there was clubbed feet, with a marked prominence of the instep. Dr. Hunt said that there had been only about 200 of these cases reported.

DR. L. PIERCE CLARK said that the chief interest to him in the subject under presentation and discussion was that we were now in a position to refute the theory propounded by Oppenheimer and his school that Friedrich's ataxia was an hereditary luetic affection. The Wasserman and Noguchi blood tests in these cases are entirely negative. The theory of Edinger and Gowers that of Abiotrophy best explained the disorder here as in muscular dystrophy, where blood tests for hereditary lues were also negative. The theory maintains that certain parts of the body, such as special muscle groups, nerve tracts and ganglia, have not only a defective development, but also meet with an untimely death.

DR. RICHARD B. KRUNA believed that it would be reasonable to attempt some forms of exercise in these cases, starting with having the child instructed again as to the use of the muscles; in fact, a system of reëducation.

DR. HENRY W. FRAUENTHAL believed that this instruction should be given with the child in front of a mirror; they should

be taught, too, to concentrate their minds on the work they were doing.

DR. HUNT said that the prognosis in these cases was not good, for such patients generally died before they attained the age of twenty-five years.

A CASE OF GUMMATOUS INFILTRATION OF THE MENINGES.

DR. GODFREY R. PISEK said that this case, a girl of six years, was born prematurely and weighed $3\frac{1}{2}$ pounds at birth. With the exception of pneumonia at the age of nine months and pertussis at the age of three years, she had had no serious illness until the present. A year ago she had a convulsion, and two months later, after a walk of about a mile, she had another, after which she was lame. Five months ago she had another, after which she seemed to be in good health, except for the lameness. About three weeks after the birth of the child there had been scaling of the palms of the hands and soles of the feet, which promptly disappeared. Prior to the first convulsion the mother had noticed both mental and physical deterioration. The mother learned that the father had a luetic history and was treated during her second pregnancy on the advice of her physician, and gave birth to a healthy, robust boy. Physical examination of the child showed a fairly well developed girl of six years. Her nutrition was not impoverished, but there were marked circulatory disturbances, cyanosis of the hands and feet, the skin of the feet being dry and atrophic. When in the erect posture she assumed a leaning position from the hips. She could stoop and walk alone, but preferred a helping hand. In the sitting posture she had a relaxed spine. She had inguinal adenitis. The left median incisor tooth was notched and loose and the lower median incisors notched. There was general caries of the teeth. The heart sounds were normal, liver one inch beneath the right costal margin. The spleen was not palpable. There was spasticity of the lower extremities, exaggerated knee jerks and Kernig's sign was present and positive. There was some hyperesthesia all over the body; no anesthetic zones found. The language was repetitional and somewhat incoherent. Examination of the eyes showed a peppery granular appearance around the macular region and a pale disc. The condition was descending atrophy of the optic nerve due to degeneration compression. A tentative diagnosis of gumma of the base of the brain was made, based upon clinical

symptoms, as at that time neither the father nor the mother admitted luetic infection. The Noguchi modification of the Wasserman reaction was made and was positive. The Noguchi reaction was negative for the father, but for the mother was distinctly positive. The diagnosis was made upon the complex multiform character of the symptoms, both motor and sensory, with psychical changes which were startling. From the motor, sensory and ocular symptoms one could conclude in this case that there was a diffuse gummatous infiltration of the meninges. The question of the relation of the mother to the condition was interesting and important. It was not yet clearly established whether a syphilitic child could be born of a mother who was herself free of lues. Thomsen and Boas had examined a sufficiently large number of cases of hereditary syphilis to make their conclusions of some value, and they conclude that a positive Wasserman reaction in the mother lessens the possibility of the child being born sound. Latent syphilis in children might give a faintly positive reaction and the reaction might wholly fail during the first month. The mothers who bore syphilitic children were themselves to be looked upon as syphilitic if their blood gave a positive Wasserman reaction. Knöpfelmacher concludes that the serum of mothers having syphilitic children, whether they have had symptoms or not, whether they have been treated for syphilis or not, gives a very high percentage of complement fixation and that the mothers of children having syphilis gave as high a percentage of positive Wasserman reactions as did men who had reached the latent stage of the disease. A positive Wasserman, if leprosy be excepted, must always mean syphilis; but a negative or faintly positive Wasserman carried with it no such weight. Furthermore, it was almost certain that syphilis, and especially latent syphilis, might occasionally give a negative result. Hence it would not be at all unexpected to find that 40 per cent. of mothers, whether they have had symptoms or not, fail to show complement fixation. While it was too soon to draw absolute conclusions serious doubts were thrown on the correctness of the Colles Law, and it might fairly be claimed that it was only a question of time before the incorrectness of the law would be established. At present it seemed highly probable that the mothers of children with hereditary syphilis were syphilitic also.

DR. WILLIAM P. NORTHRUP said he was not so sure that this was a case of gummatous infiltration of the meninges, as it was a

proliferation of the connective tissue. He had seen many of these cases with a thickened dura and pia, but with no gummatous infiltration.

CASES OF INTESTINAL INFANTILISM OF HERTER.

DR. ROWLAND G. FREEMAN referred to 5 cases reported by Dr. Christian A. Herter in 1908, in which the symptoms were arrested development of the body, marked abdominal distention, often with dilatation of the abdominal veins over the upper part of the abdomen. There was usually very marked fatigue and moderate anemia. There was a tendency to looseness of the bowels with occasional attacks of diarrhea, often with fatty stools, though there might be but little fat in the food. These cases were apt to have an excessive appetite and thirst, increased secretion of urine and cold hands and feet. Symptoms of rickets might be present. Herter found an absence of the ordinary bacterial flora of the intestines of young children. The organisms present were Gram positive, the prevailing organism being the *bacillus bifidus* of Tissier, together with the *bacillus acidophilus* and the *bacillus infantilis*. The *bacillus coli* and the *bacillus lactis aerogenes* were infrequently found during the active stage of this disorder. The amount of urine passed was large; there was a rise in the ethereal sulphates, a pronounced indicanuria and an excessive phenol and the presence of aromatic oxyacids. Herter found gelatin particularly useful in increasing the weight in these patients. Dr. Freeman reported 3 cases of this condition which he had seen recently. The first case had been under his care for eight months. She was three and a half years old and had had frequent attacks of bowel trouble and was greatly debilitated. No food had been found which appeared to increase her weight until about a month ago, when she began taking buttermilk. She had gained 2 pounds and there was an improvement in the character of her movements. There has been a general improvement in her condition, though an examination of the urine and feces shows the characteristic condition described by Herter, and the administration of intestinal antiseptics had had no influence on the bacteria of the intestines. The second case, a child of nineteen months, showed the classical symptoms of this condition, and there were also some colon bacilli present in the feces. This child had not gained on any modification of milk that had been tried. She did best on a preparation of dried skimmed milk to which

a moderate amount of fat was added in the form of cream. The third case was a child seventeen months old, who did well until last July, when she had an attack of vomiting, diarrhea and fever. Similar attacks followed at intervals, and she did not gain in weight. Although many different foods had been tried and a wet nurse had been secured, there had been practically no increase of weight since last July. This case approached the type of intestinal infantilism described by Herter, but was not characteristic. The feces showed the characteristic bifidus, which was very abundant, as well as the coli communis and some cocci.

A CASE OF SPASTIC PARAPLEGIA TREATED BY RESECTION OF
POSTERIOR NERVE ROOTS.

DR. JOHN J. MOOREHEAD presented a boy, seven years old, upon whom a resection of the posterior nerve roots of the second, third and fourth left lumbar nerves had been done, according to the method of Dr. Alfred S. Taylor, with resulting flaccidity and improvement in general condition.

DR. GODFREY R. PISEK said that when the boy entered the hospital he knew that he was a fit case for operation, especially as the spastic paraplegia was associated with a good mental condition. The spasticity was very marked; the boy could walk only on his toes, holding on to the bed or some other furniture.

DR. L. PIERCE CLARK thought that Dr. Moorehead was to be congratulated on the excellent clinical outcome in this case. Orthopedic training could now be employed with great advantage. He would advise a further resection of half of the dorsal nerve roots of the first and second sacrals in a year from the first operation. His own series of operated cases were making excellent progress under physical training and would be presented at a future meeting.

A "CONGENITAL FREAK."

DR. HENRY W. FRAUENTHAL presented a child with congenital double club feet and hands, a congenital dislocation of the hip on one side, and a knee which was at right angles to the normal axis. As he termed the case it was a "congenital freak."

NEW SIGNS OF MENINGITIS FROM FRENCH AUTHORS, WITH
ILLUSTRATIONS.

DR. WILLIAM P. NORTHRUP spoke of the new signs that he had read of in French journals and of their application.

THE NEW ENGLAND PEDIATRIC SOCIETY.

Meeting held March 26, 1910.

DR. CHARLES P. PUTNAM, CHAIRMAN.

CIRCULATORY FAILURE IN THE ACUTE INFECTIONS OF CHILDREN. CAUSES AND TREATMENT.

This paper was read by Dr. John Howland, of New York.
(See page 332.)

DR. DUNN.—I did not hear the very beginning of Dr. Howland's paper, but I was very much interested in listening to the remainder of it. I have thoroughly accepted the theory that the circulatory failure in these conditions is due to inflammatory or degenerative changes in the heart itself, although that did not seem a very satisfactory explanation, particularly in connection with the results of the autopsies I have done at the Infants' Hospital, in which a great many children who had died apparently from circulatory failure in the course of acute infectious processes presented an absolutely normal condition of the heart muscles, valves and everything else. I think that the explanation that Dr. Howland presents, with the evidence in its favor, is very much more satisfactory than the old idea that these circulatory failures are due to a condition located in the heart itself. Occasionally in the course of acute infections there are circulatory disturbances which prove to be due to conditions in the heart itself, but it seems to me that these are easily recognized and differ very much from the form of circulatory failure which Dr. Howland has described. Most of the cases in which there are true cardiac lesions present actual symptoms of a cardiac incompetency, such as cardiac irregularity and murmurs, which differ in a marked degree from the symptoms described by Dr. Howland as due to vasomotor disturbance. I should think it is usually possible to distinguish the rare cases where circulatory failure is due to cardiac conditions from the commoner ones in which it is due to the vasomotor center conditions.

DR. BOWDITCH.—I was very much interested in listening to Dr. Howland's paper especially as it has dealt with a subject that I have been interested in and which I was asked to consider in discussing this paper—circulatory

failure in diphtheria. It seems to me that the 2 cases I am going to offer illustrate well what Dr. Howland has said, and that despite the fact that antitoxin was given in small doses, strychnia given to fight the succeeding cardiac disturbance and large amounts of brandy do not do much to aid the collapse. Whether fresh air at that time had any influence on these patients I cannot say. It is interesting to note that these 2 cases took place in July, 1903, when small doses of antitoxin were not infrequent. These patients received injections of 12,000 and one of 4,000 units, although septic and with a membrane extruding on both tonsils and soft palate. The apparent improvement of the pulse after the fall of temperature was only temporary; gallop rhythm appeared in ten days to two weeks, then disappeared, and, after a certain length of time of seeming recovery, both patients suddenly died of heart failure. I will pass the two charts and hope that they will prove interesting. I should like to ask Dr. Howland whether oxygen was tried when children were taken into the wards as a possible factor in fresh-air treatment; further, when he thinks about the cold-air treatment of diphtheria patients.

DR. LADD.—I should like to ask Dr. Howland if there is not a distinction between the acute circulatory failures occurring in the beginning of infectious diseases and those that appear late in convalescence, and if the causes of sudden death in the latter cases are the same as in acute circulatory failure occurring in the beginning of the disease. Are not some of these deaths due, not to a central paralysis of the vasomotor apparatus, but to interstitial myocarditis? I have been particularly interested in what Dr. Howland has said as to the use of caffein, and I wonder how many of the physicians here carry subcutaneous preparations of caffein? The majority of physicians, I believe, have depended chiefly upon strychnin, but after listening to Dr. Howland's paper we shall use more caffein than in the past. One of the most important things in the treatment of these cases of circulatory failure, and one which is very difficult to obtain in children, I think, is absolute rest, and this is something which ought to be impressed upon us very strongly. I saw a striking case where, from over exertion in the acute stage of infection, acute circulatory disturbance set in and the child died in a very few days. The child was a spoiled boy, absolutely intolerant of restraint, and after wearing out a nurse

in two days, refused to take medicine from the second nurse. In order to have them bring the first one back, he resorted to an outburst of temper, suddenly sprang up in bed, yelled with anger and fell back, dying a few hours after. The difficulty of controlling the patients in their homes in these conditions, especially those who have never been restrained, is very great, and yet I fancy that this element of rest is most important of all in the treatment of these conditions.

DR. LUCAS.—There are two things I am very much interested in, which I wish to speak of in this connection. One of them, which I wish to impress strongly on the profession, is the fact of over-stimulation. There are so many cases that come into the hospitals that we see, especially in children with pneumonia and other acute conditions, which we feel have been over-stimulated. The fact of over-stimulation, I think, is something that is even worse, from many points, than no stimulation at all. There are more cases, I think, in children who are over-stimulated, given too much strychnia, or too much brandy, than those who are not given enough. I was very much interested in Dr. Howland's remarks about caffein. This is one of the drugs that I have been trying to use a good deal, and I have seen more results from it than any other one single drug in these acute infections, especially in pneumonia. That is the only really acute infectious disease in which I have been able to use it and note its effect not only hypodermically but by rectum. Given by injection is something we have not done to any extent, but hot coffee is something which is in use in every household and is one of those stimulants that anyone can resort to in these circulatory failures. I am very glad that Dr. Howland mentioned these two things.

DR. PLACE.—I have enjoyed greatly the splendid and stimulating paper of Dr. Howland, which has well proved the importance of vasomotor paralysis in these conditions.

In diphtheria, however, I must say my experience does not bear out his remarks.

In this disease, circulatory failure is a most marked feature. It may occur as early as the first week. The variation in the type of symptoms would not favor the vasomotor paralysis as the sole cause. The circulatory disturbance may be of several types.

(1) Slow, regular heart action, often reaching 25 or 30 per

minute; (2) gallop rhythm, with or without marked change in rate; (3) delirium cordis; (4) sudden death without distinct or even suspicious symptoms of circulatory disturbance.

Clinically, also, I have yet to find a case of diphtheria at any stage of the disease with circulatory disturbance in which distinct changes in the character of the heart's sounds were not present. Dilatation is often not demonstrable, however.

Pathologically, also, in these cases, muscular changes in the heart are present.

My experience in the use of drugs for this condition is in practical accord with the speaker's. Alcohol, adrenalin, digitalis, cocain do not do good and apparently do harm. Strychnin shows no appreciable effect. Caffein and camphor have given slight benefit.

Nothing, however, has been of so much benefit, in my opinion, as complete rest, horizontal position, interdiction of everything by mouth, rectal alimentation, and morphin in very small doses, subcutaneously. The first 6 cases in my experience of severe circulatory disturbance, with gallop rhythm, pallor and persistent vomiting, treated with this method, recovered, and the mortality has been distinctly lowered in contrast with that of the "stimulated" cases.

The value of raising the blood pressure, throwing more work on the heart muscle, and causing heart wear, certainly may be questioned at times in these cases.

Cold-air treatment has proved of value when the patient is very restless, but artificial heat is almost always needed to keep up body temperature.

DR. HOWLAND (in closing).—It will be better to answer the last question first. I believe the exact position of the vasomotor center is not known, and there are no constant pathologic findings in the nervous system. So far as I know, none have ever been described. It is only by experimental methods that the involvement of the center has been shown.

I spoke especially of the circulatory failure that occurred at the height of disease, in the first seven or ten days. The lesions then are parenchymatous ones; after seven to ten days there are in addition interstitial lesions. I would be the last to assert that patients with diphtheria died late in the disease as the result of vasomotor paralysis. I think that then they almost always die of myocarditis. Where the influence of the vasomotor paralysis

is shown in diphtheria is at the height of the disease, in the so-called septic cases, when death may take place on the fourth or fifth day. The cases of diphtheria with late circulatory failure I especially avoided in this discussion. There is no doubt whatever that, as various experiments have shown, the cardiac muscle in diphtheria is somewhat affected even if death takes place chiefly from vasomotor paralysis. The heart itself is affected after temporary asphyxia and it never regains its full power as it does in pneumococcus infections and streptococcus infections. This has always seemed to me one very urgent reason for performing intubation early in diphtheria, thus preventing a certain degree of asphyxia so that at the height of the disease the heart, in addition to the vasomotor center, will not give out.

Dr. Ladd spoke of the cases in which the pulse ceased before the respiration. The pulse often ceases before the respiration, but the heart does not cease to beat. There may be no pulse at the wrist but by auscultation the heart may be heard beating—irregularly and tumultuously, to be sure, but often very powerfully, endeavoring by its over-activity to fill up the empty arterial system. I think one can never tell that the circulation gives out before the respiration unless one auscultates the chest.

Dr. Lucas spoke of the over-stimulation of patients. I believe that the majority of patients are over-stimulated, and I think with wrong drugs. They are certainly stimulated altogether too much with alcohol. Dr. Lucas also spoke of caffeine. A good preparation of caffeine, I think, is the best of the various stimulants. But I believe that many of the preparations of caffeine that are used are almost or quite inert. I tried at Bellevue three preparations of caffeine made particularly for the purpose, the citrated, the sodium benzoate and the sodium salicylate of caffeine. From the first two we obtained very slight results, but we had prompt and positive and constant effect from the sodium salicylate. I think the other preparations were bad, and I am sure this is true of very many of the drugs which we use and which we rely on.

Dr. Bowditch spoke of the use of oxygen in the wards. I have not tried its effect on the blood pressure, but the wards where these readings were taken were as well ventilated as could well be, so that we are inclined to the belief that it is the effect of the cold alone which increases the blood pressure by ten or fifteen mm. of mercury.

THE PHILADELPHIA PEDIATRIC SOCIETY.

Special Public Meeting, Tuesday, March 22, 1910.

CHARLES A. FIFE, M.D., PRESIDENT.

SYMPOSIUM ON MENTALLY DEFECTIVE CHILDREN.

OBSTETRICAL ACCIDENTS CAUSING MENTALLY DEFECTIVE CHILDREN.

DR. EDWARD P. DAVIS, by invitation, read this paper. He discussed the accidents of pregnancy and of labor which might cause mentally defective children. Among the accidents of pregnancy may be mentioned sudden or violent mechanical force or great nervous shock; malnutrition; hereditary defects; race degeneration from alcoholism and syphilis; toxemia and acute infections. The accidents of labor may be due to pressure and asphyxia, occurring with unattended labor, abnormal labor, ill chosen or badly performed obstetric operations. Dr. Davis also showed how most of these accidents could be prevented.

THE RELATION OF OCULAR DEFECTS TO DEFECTIVE MENTALITY IN CHILDREN.

DR. WILLIAM T. SHOEMAKER, by invitation, read this paper. He considered children who were deficient or backward, but tractable, offering promise of betterment or standardization. The relationship between ocular defects and defective mentality is not one of cause and effect, but both mental and ocular defects are equally related to some other common cause. The observed phenomena belong, as a rule, to that class designated by Walton as deviations, in contradistinction to the so-called stigmata of degeneracy, and children so affected are better classed as deviates than as degenerates. These deviations may be noted in any part of the ocular apparatus and range from harmless anomalies of congenital origin to more serious conditions, either primary or secondary. Among the common deviations are malshaped skulls, with facial asymmetry and abnormally placed orbits; defects in the extraocular muscles; congenital defects and diseased condition of the eyelids; anomalies in the iris, lens, uveal tract, retina and optic nerve; and finally, errors of refraction. These conditions and their sequelæ may act as a source of peripheral irrita-

tion; others, such as congenital cataract and errors of refraction, may obstruct or prevent mental development. Backward children do not, as a rule, suffer from eye-strain. They seldom have headache referable to the eyes, because they have little interest in such use of their eyes as would cause asthenopia. Ametropia is not a cause of mental deficiency in children, but is a serious obstacle in the way of mental development. In dealing with defective children, all obstacles must first be removed and it must be remembered that all knowledge of the outside world must reach a child through the special senses. The best possible vision with the least possible effort and attention to the protective apparatus of the eye-ball are important. Parents, guardians and teachers should be instructed in the medical status of the backward child; should be taught the possible significance of the outward signs of backwardness, and should search for peripheral irritation and obstruction, particularly for those connected with the organs of special sense.

THE HEARING AND SPEECH OF THE BACKWARD CHILD.

DR. G. HUDSON MAKUEN, by invitation, read this paper. He said that three important cerebral faculties, hearing, speech and intellectualism, are so closely interwoven in respect to their functional activities that no one of them can reach its highest point of efficiency without a corresponding development of the other two. So great is the dependence of the glossokinesthetic center upon the auditory speech center that the former has never been known to come into existence prior to the development of the latter, except through special training. In this training an effort is made to make up for the lack of hearing by establishing a communication between the glossokinesthetic area of the brain and the visual and tactile centres. Without a certain degree of intellectualism there can be no orderly development of language, and without the development of language there can be no orderly development of intellectualism. The character of speech is an index to the facility of hearing and to the other important cerebral functions. The deaf child does not learn to speak because speech is developed only by the imitation of words that are heard, and the feeble-minded child does not learn to speak because it requires a certain amount of intellectualism to train and develop the lower speech centers. The character of the speech furnishes a scientific basis for the diagnosis and treatment of atypical conditions of child-

hood. For practical purposes, two classifications of defective children should be made, those whose defects are organic, and those with functional defects. This is not always easy to do. The various cerebral faculties are to the individual what tools are to the mechanic, and we should no more expect a child to develop intellectualism without hearing and speech than we should expect a carpenter to become a skilled mechanic without a hammer or saw. Dr. Makuen then exhibited two children, one, formerly backward, has eliminated himself from the backward children by developing speech and a fair degree of mentality. The other, backward because of deafness, is developing speech through the substitution of the visual and tactile centers for the undeveloped auditory centres.

POSSIBILITIES OF DEVELOPMENT FOR MENTAL DEFECTIVES
AND THE STATE'S CARE OF THEM.

DR. MARTIN W. BARR, by invitation, read this paper. He reviewed work done in developing defective intelligences from the beginning of the nineteenth century. In 1800 Itard formulated the first scheme for training imbeciles. This was modified by Seguin, and later, at Bicetra, attracted the attention of Europe and America. By the middle of the century Seguin carried the work on in America himself, and public and private institutions were built. Then these cases were grouped distinctly, with means for development adapted to their several needs. The experience of a century is embodied in an educational classification by means of which teaching and training are conducted on simple physiologic lines, with assurance of a certain successful development for these, who must, however, always remain defective. Pennsylvania, at first providing for her helpless class only in the institution at Elwyn, with which, in its inception, Seguin was associated, has later opened institutions at Polk and Spring City; yet this provision for over 2,500 does not yet meet the requirements of the ten thousand mental defectives credited to this state.

HOW TO GET THE BEST RESULTS IN TRAINING THE MENTALLY
DEFICIENT CHILD.

MR. E. R. JOHNSTONE, by invitation, read this paper, giving first the results of training mentally deficient children in the past. Training before seven and continued after sixteen is seldom of

any value. If the child is defective, he should be under custody all his life. As his time for learning is short we must limit the things presented to him to those we know are important. He must know enough to read simple things, to write his name and a simple letter, and to count money. First try to find the things that make the child happy; especially things to do with his hands. The teacher should begin with things the child knows and then work to the unknown, the names of things, their uses, etc. But the child's time is too short to give him anything else, unless he uses all you give him and asks for more. Girls may become good housegirls; boys, assistants to carpenters, plumbers, painters, etc.

DR. J. D. BURKS, Director of the Bureau of Municipal Research, in opening the discussion, called attention to the necessity for getting school officers, teachers, parents and the public to face the facts concerning mentally defective children. There is need for a standard series or tests or measurements, by which a person without expert knowledge can grade a child roughly, so that he may know something definite about the children under his care and refer doubtful or abnormal children to the expert for diagnosis. At present only the most obvious types of mental defect are considered by teachers and parents as requiring special attention. A large number of pupils in every public school fail to profit by school training; they are wasting time, their time and that of teachers, principals and other pupils, because they are misplaced, misunderstood and mistreated by those adults who are responsible for knowing the facts as to physical and mental defects and for adapting school methods to children's needs.

DR. JAMES THORINGTON added that, in sixteen years' experience in examining mentally defective children at the Elwyn and Vineland Training Schools, he had noted great improvement in mentality follow the use of glasses. Some of the children would consider glasses nothing less than a toy or something to destroy. About 75 per cent. of children needing them, among the high and middle grades, would appreciate the glasses and wear them. Glasses were ordered whenever the error was over one diopter in strength. It was common to find unusual amounts of high astigmatism and of unusual axes as compared with normal children. The glasses are a great factor in opening to the brains of these defective individuals one pathway to a more perfect appreciation of surroundings, and by correction or relief to eye-strain, excessive

in nearly every instance, the child is put in a more quiet and receptive mood. The change in disposition from irritability and temper to a gentle and cheerful nature was often noted after correct glasses were prescribed. Just as normal children have their eyes examined, so should the mentally defective, and whenever glasses are indicated they should be ordered and given a fair trial.

DR. WALTER S. CORNELL stated that the record of a child's present ability is often a poor index to his real capabilities. A charted record of psychological tests alone tells nothing certainly in border line cases. The diagnosis of feeble mind, like that of insanity, is essentially a medical subject and is a judgment of the various effects of heredity, organic brain defect, health, environment and age upon the individual's mental development. There is a great difference between public school children and institution children in environment, and in cases of doubtful mental development the elimination of this factor in institution children makes diagnosis much easier. The only attempt so far made to devise a system for recording mentality, which at the same time forms a judgment for the examiner as to the existence of feeble mind, is the test series of Binet. He provides several tests for children of every age, using tests asking knowledge which is acquired unconsciously and independently of school education. These tests have not yet been tried on public school children. If they correspond well to age periods they will provide a method whereby it may be said that a child is so many years behind his normal age development. In such cases this will supply the need of which Dr. Burks has spoken.

DR. S. D. RISLEY said that one of the highest functions of the medical profession was the aid and direction it could give in sociologic studies. He believed that all medical schools should have an additional chair devoted specifically to the study and teaching of sociologic medicine. Dr. Risley said that the classification of backward children in the public schools could be done wisely only by experts like Dr. Barr or Mr. Johnstone, both of whom had had wide experience in the grading of imbeciles. There were many children backward in their studies at school, from a great variety of causes, who had normal brains, to whom it would be an injustice to be classed with the congenitally feeble-minded. Backwardness might be and often was caused by defective vision or hearing. Dr. Makuen has well illustrated the importance of de-

fects of the special senses; his explanation was not only illuminating but suggestive. The concordant action of the special senses, through their association centers, over the intellectual processes had not received due attention. It was not to be expected that a clear mental concept could be had from a blurred and incorrect visual image due to congenital ocular defect, which might be corrected by glasses or other means; but mental backwardness due to such causes should not be confused with the hopeless conditions found in the congenital imbecile. In the one case the avenues of approach to a normal brain were impaired; in the other the avenues might be open and normal, but the brain hopelessly defective.

DR. ERNEST LAPLACE thought that the whole question was one of diagnosis. Backwardness in children is due to inherited or acquired causes. From a surgical standpoint, among acquired causes, he has established a trilogy; backward children should always be examined for adenoids, phimosis and tongue-tie. He would also advocate a new chair of eugenics, the purpose of which would be to pass upon the aptitude of children toward education and to rectify impediments thereto.

DR. MAKUEN said that all children should be taught to speak. Stammering often results from laughing at "baby-talk," when the correct articulation should have been taught the child. In some children speech would never develop at all unless efforts were made to help the child to speak. This is true of the child that was exhibited this evening.

MR. JOHNSTONE added that, after all remediable defects had been attended to, the Binet test was of value. One must always remember that there is a great number of children of whose mentality we can never be absolutely certain, children on the border lines between mental deficiency and defective mentality. The family history is of much importance and should be obtained in every case. While he believes in culture for normal men, Mr. Johnstone wants primarily to teach each deficient child what will make him happy, training him in all that he can use and enjoy. He also believes that a child must learn to understand a thing before he can intelligently be taught to talk of it; he tries to have the child know things and then begins to teach him to talk about them.

CURRENT LITERATURE.

ABSTRACTS IN THIS NUMBER BY

DR. T. WOOD CLARKE.

DR. FRITZ B. TALBOT.

DR. SAMUEL FELDSTEIN.

DR. S. W. THURBER.

DISEASES OF EAR, NOSE AND THROAT.

HARTZ, HENRY J.: REMARKS ON THE PHYSIOLOGY AND DEVELOPMENT OF THE NOSE AND ACCESSORY SINUSES AND NASAL REFLEXES, WITH SPECIAL REFERENCE TO THE FUNCTION AND IMPORTANCE OF THE TURBINATE BODIES. (*Annals of Otology, Rhinology and Laryngology*, December, 1909, p. 709.)

The author thinks that the physiologic importance of the nose has been underestimated during the period of infancy and childhood, when it is especially prone to inflammatory obstructions. Sixteen figures accompany his article to illustrate (1) that during the first three years of life respiration is confined chiefly to the ethmoidal region, which then is twice as high as the maxillary portion of the nose and the inferior turbinates are often touching the nasal floor; (2) not until adult age is the maxillary portion of the nose as high as the ethmoidal portion; (3) the head and face grow more rapidly in two periods—from birth to the eighth year, and, secondly, from puberty to nineteen or twenty years of age. The nasal space is increased by the downward growth of the hard palate, which, if extended backward at birth, would strike near the junction of the basilar process and the body of the sphenoid; at three it has grown down to strike about the middle of the basilar process; and in the adult it would strike the edge of the foramen magnum.

S. W. THURBER.

SURGERY.

SEVER, J. W.: TUBERCULOSIS OF THE SHOULDER IN CHILDREN. (*Boston Medical and Surgical Journal*, March 24, 1910, p. 383.)

Tuberculosis of the shoulder joint is a rare condition in children; of all the large joints it is the least frequently attacked. It

is said to occur rarely before ten years of age and to be commonly associated with phthisis, and also to follow an injury, such as a blow or a fall. The onset is slow and may be confused with chronic rheumatism. Tenderness is an early symptom, usually over the anterior aspect of the joint. Impairment of motion is an early symptom, with reflex spasm, which is most marked in the deltoid. Rest is the essential part of treatment and when an abscess forms it should be opened and necrotic bone removed. General treatment is of great importance as in all tubercular conditions.

FRITZ B. TALBOT.

ORTHOPEDICS.

JOACHIMSTHAL: THE DIAGNOSIS AND TREATMENT OF CONGENITAL DISLOCATION OF THE HIP DURING INFANCY. (*Berlin. klin. Woch.*, December 13, 1909, p. 2,225.)

The generally accepted age of election for the treatment of congenital hip dislocation is between the ages of two years and six years. This low limit is given as before that age it is difficult to keep the bandages clean and the skin healthy. The author has investigated the success of treatment during the first few months of life. The diagnosis at this early stage may be made by flexing both hips to a right angle. If they are then abducted with equal force the two thighs take different angles. The dislocations should be reduced by manipulation and the child placed upon a plaster of Paris bed made by moulding the plaster to the child's back while it is lying on its face. The bed is cut wide in the region of the anus, and is protected by rubber tissue. The child is bound to this, in the position of correction, by soft bandages, which are changed daily, while the child lies on its face. The results have been good. There has been no soiling or irritation of the skin, and, after three to four weeks, on removing the dressings, the heads of the femurs were shown by the X-ray to be in the acetabula.

T. WOOD CLARKE.

MEDICINE.

MULLER, EDUARD: THE EARLY STAGE OF SPINAL PARALYSIS. (*Münch. med. Woch.*, November 30, 1909, p. 2,460.)

Fifty cases of anterior poliomyelitis have been studied and several suggestive instances of contagion by a third party are mentioned. In the early stage there may be fever alone or combined with tonsillitis or bronchitis. In many of the cases other members of the family had similar initial symptoms but developed no paralysis. There are three cardinal symptoms in the diagnosis of poliomyelitis in the febrile stage. The first is profuse perspiration, the second is a general cutaneous hyperesthesia, which is considered pathognomonic, and the third is a leucopenia.

T. WOOD CLARKE.

SCHICHOLD, PAUL: THE TONSILLAR TREATMENT OF THE SO-CALLED RHEUMATIC DISEASE. (*Münch. med. Woch.*, February 8, 1910, p. 281.)

The exciting cause of rheumatic fever lies in the pus filled crypts of the tonsils, from which the poisonous materials, bacteria or toxins are absorbed into the circulation. The tonsils may be deeply and dangerously diseased without showing externally any change except a slight enlargement. It is therefore advisable in every case of articular rheumatism to do an immediate and complete tonsillectomy. Only in this way can complications and recurrences be prevented.

T. WOOD CLARKE.

SCHRIDDE, HERM.: EDEMA NEONATORUM. (*Münch. med. Woch.*, February 22, 1910, p. 397.)

Careful pathologic examinations have been made on 3 typical cases of edema neonatorum. The edema was marked. The subcutaneous tissue contained a gelatinous material. There was ascites, pleural and pericardial effusion. The liver, spleen and mesenteric glands were much enlarged. There were no signs of syphilis. The liver and spleen showed marked myeloid infiltration. The liver contained much hemosiderin. The heart contained lipochrome pigment. The bone marrow contained many myelocytes. In the blood were enormous numbers of erythroblasts and myelocytes and myeloblasts; there were but few poly-

morphonuclear leukocytes or lymphocytes. There were many megalocytes. The entire picture was that of a primary anemia.

T. WOOD CLARKE.

MICHAELOWICZ, M.: VERTEBRAL PERCUSSION IN THE DIAGNOSIS OF TUBERCULOUS TRACHEOBRONCHIAL LYMPH NODES IN CHILDREN. (*Jahrb. für Kinderhk.*, January, 1910, p. 29.)

The technique of this method as practiced by the author is as follows:—The child is seated on the edge of the table with the legs swinging freely. The arms are held extended in front of the patient, while the head is depressed until it almost touches the sternum. The trunk is bent well forward so that the spine is almost horizontal. The level of the vertebra prominens is then determined and the spines of the first, fourth, seventh and twelfth vertebræ are marked with a blue pencil. Percussion is performed by use of the fingers and not the pleximeter. The percussing force should vary with the individual case, that degree of force being used which gives a clear note.

Twenty-two cases are reported by the author, in which the results of the physical examination were confirmed either by the X-rays or by autopsy.

The author arrives at the following conclusions:—First, in normal children, there is a clear full note from the first to the fifth dorsal, and a gradually increasing dull note from the fifth or sixth dorsal vertebræ down.

Second, in tuberculosis of the tracheobronchial nodes, there is dullness between the first and fifth dorsal vertebræ. Dullness over the upper four indicates enlargement of the tracheal nodes; over the fourth and fifth and in older children over the sixth vertebræ it indicates enlargement of the nodes at the bifurcation. Such enlargement does not necessarily speak for the process being tuberculous in nature, but when there is associated with this sign a positive Von Pirquet or Escherich reaction the diagnosis of tuberculous nodes is permissible.

Third, these results correspond closely with those found at autopsies, so that it is fair to claim that vertebral percussion is one of the most reliable methods for the diagnosis of this condition.

Fourth, enlargement of the heart and moderate scoliosis or kyphosis do not diminish the value of this method.

Fifth, by percussion the diagnosis of enlarged nodes can be made at a very early stage, often when the X-ray examination is still negative.

S. FELDSTEIN.

FORSSNER, G.: THE PERSONAL HISTORY OF CHOREA PATIENTS, FIFTEEN TO TWENTY YEARS AFTER AN ATTACK. (*Jahrb. für Kinderhk.*, January 4, 1910, p. 81.)

The subsequent history of 28 cases of chorea, treated during 1885-1890 at the *Kronprinzessin Louises Heilanstadt* at Stockholm, were investigated in detail by the author. Seven of the patients died of endocarditis, and five at the time of publication were suffering from the same disease. In 5 cases pulmonary tuberculosis developed within a variable period. In 7, albuminuria was present (2 of these probably being nephritic in nature). In 1 case there was enlargement of the thyroid associated with cardiac affection (Basedow ?), and in another there were present severe gastric symptoms and considerable emaciation. Only 1 out of the total 28 was apparently in a normal condition when the subsequent history was obtained.

A comparison of the chorea cases with the later history of 35 rheumatic patients showed a striking difference in the frequency of occurrence of affections not directly associated with chorea or rheumatism, as in the rheumatic cases there were at least 15 in whom no subsequent disease developed, with the exception of endocarditis.

The author attributes this marked difference to the fact that chorea in contrast to rheumatism usually affects children who are delicate and whose resistance to disease in general is much reduced.

S. FELDSTEIN.

KNÖPFELMACHER AND LEHNDORFF: COLLES LAW AND RECENT ADVANCES IN OUR KNOWLEDGE OF SYPHILIS. (*Jahrb. für Kinderhk.*, February 1, 1910, p. 156.)

The exact mode of transmission of syphilis from parent to offspring is a problem which has often engaged the attention of syphilographers.

Recently, but antecedent to the discovery of the spirocheta and serum reaction, Matzenauer aroused renewed interest in this subject by his contention that syphilis is transmitted exclusively through a diseased placenta, that every mother of a syphilitic

infant suffers from a latent form of syphilis, and that Colles Law is merely the expression of the well-known resistance of this disease to reinoculation. A vast number of studies stimulated by the discovery of the spirocheta and Wasserman reaction have recently been made regarding every phase of syphilis.

Anatomico-pathologic studies have shown the great frequency with which the placenta and cord are diseased. Although spirochetæ were frequently found in the cord there are few cases recorded of their presence in the placenta. But this fact in itself does not speak against the placental mode of transmission, as it may merely indicate that the placenta, in marked contrast to the cord and other fetal organs, is a poor culture medium for the spirochetæ.

The results of extensive sero-diagnostic studies are apparently more convincing. The authors examined 116 mothers of luetic infants. For the purpose of comparison they were divided into two groups. The first group included those mothers who gave no history of syphilis or antisyphilitic treatment. The second group comprised those with a positive history of syphilis or antisyphilitic treatment. In the first group there were 90 cases, 54, or 59.3 per cent., of whom gave a positive Wasserman reaction. There were 25 cases in the second group, of which 18, or 72 per cent., had a positive Wasserman. When the cases are classified according to the date of birth of the last syphilitic infant, striking results become evident. In 74 mothers, all of whom belonged to the first group, the date of birth of the last child could be ascertained. Of 12 mothers, in whom the serum examination was made in the same year as the birth, 91.6 per cent. gave a positive reaction. Those in whom the serum examination was made the year subsequent to the birth gave only 65 per cent. positive results, while those in which the pregnancy dated back three or more years showed 44 to 50 per cent. positive Wasserman reactions. These figures correspond closely with those obtained in recent and late syphilis respectively. The possibility of the passage of those bodies on which the Wasserman reaction is supposedly dependent from the fetal into the maternal circulation is discussed from a theoretical point of view, but rejected by the authors as improbable.

Yielding the reaction in the same proportions as persons known to be syphilitic, it is fair to assume the existence of syphilis in most of the mothers of syphilitic offspring. From this study

the authors deduce that in the vast majority of cases hereditary syphilis is transmitted through the mother.

S. FELDSTEIN.

CUNNINGHAM, JOHN H., JR.: DEATH FOLLOWING RECTAL ANESTHESIA IN A PATIENT WITH AMEBIC DYSENTERY. (*Boston Medical and Surgical Journal*, March 24, 1910, p. 387.)

This case is reported to draw attention to the fact that rectal anesthesia is dangerous in diseased conditions of the intestine. Very careful examination of the stools should be made prior to the use of this method of anesthesia.

FRTZ B. TALBOT.

ALKSNE, J. O.: TWO CASES OF ACTINOMYCOSIS OF THE LUNGS. (*Deutsch. Aerzte Zeit.*, March 15, 1910.)

Actinomycosis of the lungs is found in 20 to 30 per cent. of all cases of actinomycosis. It probably originates in the mouth and usually takes the form of bronchitis or bronchopneumonia. The diagnosis is made by finding the "sulphur granules" in the sputum, and the streptothrix under the microscope. The paper is a very good review of the literature and a report of the writer's 2 cases.

FRTZ B. TALBOT.

BROWN, LLOYD T.: GROWING PAINS: A POSSIBLE EXPLANATION. (*Boston Medical and Surgical Journal*, March 31, 1910, p. 424.)

The symptoms of growing pains consist chiefly of leg ache and backache, which come on at night soon after the child has fallen to sleep. These pains are usually relieved by changing position or massage. There is usually stiffness and lameness the next morning. These children are usually not well nourished and generally give a long history of digestive or stomach troubles. These children, in consequence of the poor development, are usually loose jointed. This poor development and accompanying bilious attacks are explained by lack of muscular tone, lack of normal support to the viscera by the spine and muscles of the posterior abdominal wall, and the downward pull of the transverse colon. The writer then elaborates the hypothesis that "during the day the muscles and the ligaments holding the sacrum in place are in a

constant state of contraction, and the only symptoms are that the child gets more easily tired than other children and cannot run and jump as well as his companions; at night, when sleep relaxes these muscles and ligaments, the sacrum may move or sag, and in so doing strain or irritate the joints, and this irritation may be transmitted to the lumbosacral cord or the sacral plexus and cause the child to wake with pains in his legs or back." The writer evidently has overlooked the fact that the so-called growing pains are very frequently acute articular rheumatism, and has considered the subject simply from the mechanical point of view.

FRITZ B. TALBOT.

SISTO, GENARO (Buenos-Aires): CEREBROSPINAL FLUID IN SYPHILITICS AND HEREDITARY SYPHILIS. (*Annales de Méd. et Chir. Infantiles*, No. 2, January 15, 1910.)

When there is syphilitic infection of the central nervous system there is a lymphocytosis of the cerebrospinal fluid. This may appear at the time of the rash; it has no connection with the blood picture. The writer believes that it is of importance in determining how long treatment should be persisted in because he has observed that with cure the lymphocytes disappear, and while the disease is present they persist. He practices lumbar puncture at intervals to determine the length of treatment.

FRITZ B. TALBOT.

HYGIENE.

OTIS, EDWARD O.: THE MOTHER AND CHILD IN THE TUBERCULOSIS PROBLEM. (*Boston Medical and Surgical Journal*, Vol. CLXII., No. 8, p. 233.)

The article is a plea for efforts to stamp out tuberculosis in childhood, because the child of to-day is the man of to-morrow. The writer emphasizes the fact that tuberculosis is a house disease, and that the only safe way to prevent it is to isolate a tuberculous member. There are a surprisingly large number of school children with open tuberculosis who spread infection among their mates. This infection may lie dormant until they become adults and then cause their death. He draws attention to the fact that

the State of Illinois spends annually \$1,187,000 in the education of children who die of tuberculosis before their twentieth year, thus wasting much money which might be utilized in saving those same lives. He ends the paper with ten suggestions, which, if followed, would go a long way in preventing and controlling tuberculosis in children and during the school age.

FRITZ B. TALBOT.

MCDONALD, ARTHUR: DEVELOPMENT AND LACK OF DEVELOPMENT IN CHILDREN. (*Jahrb. für Kinderhk.*, 1910, Vol. XXI., No. 2, p. 180.)

The size of the heart and the circumference of the arteries change during the growth of the body, and as a result of this there is a change in the blood pressure. This applies especially to puberty, when the heart increases greatly in volume. At this time the arteries increase in length with the length of the body, but not in circumference. There is, therefore, greater burden put on the heart.

McDonald found among 20,000 children in Washington that, aside from the influence of nationality and social position, those children with the largest circumference of the head were brighter. In general, the percentage of children with "dolichocephalie" increases with the brightness of the children. In the boys the percentages of long heads is much greater after puberty than before, while in girls it is the same before and after puberty. Those children were called abnormal whom the teachers reported as such, and it is evident that had special physicians examined them this per cent. would have been greater. The colored girls were the highest per cent. of the diseased children (12.78 per cent.). The lowest per cent. of sick children was among children of foreign parentage (2.13 per cent.). The boys of the working classes showed twice as high a per cent. (7.37 per cent.) as the boys of parents of higher social positions (3.72 per cent.). Foreign and colored children were less nervous than American born and talented children. About 10 per cent. of the untalented boys were refractory and the boys are much more so than the girls. There are several tables in the article from which these conclusions are drawn.

FRITZ B. TALBOT.

PHYSIOLOGY.

HIRSCH, JOSEF: THE PHYSIOLOGIC LOSS OF WEIGHT OF THE NEWBORN. (*Berlin. klin. Woch.*, January 3, 1910, p. 11.)

A study has been made of the apparent loss of weight in a series of infants during the first few days of life and this compared with the amount of meconium passed during the same period. The author decides from this that the initial weight loss is not due to any tissue destruction, but is dependent upon the amount of meconium passed. The net weight loss, viz., the birth weight less the low weight and the meconium passed, is but from 10 to 20 grams.

T. WOOD CLARKE.

HECHT, ADOLF F.: THE ACTION OF FATTY ACID FORMATION IN THE INTESTINAL CONTENTS OF INFANTS. (*Münch. med. Woch.*, January 18, 1910, p. 63.)

Considering the statement that the digestive disturbances of infants are largely due to the formation of abnormal fatty acids in the intestines, a series of healthy and ill infants were examined as to the various fatty acids to be found in the stools. The stools were obtained in quantity, distilled, and examined for the fatty acids. In breast-fed infants in perfect health it was found that in several cases a comparatively large amount of the fatty acids might be present without harm, but that an abnormally large amount might do damage. In those cases in which there was an excess of fatty acids in the stools a marked decrease in the fat of the food did not in every case decrease the fatty acids in the stool or improve the child's condition. In these cases the fatty acids may be formed from carbohydrates. Lactic acid was less abundant than the volatile fatty acids. On artificial feeding, if the fat in the food was greatly increased, the fatty acids in the stools decreased, a change also brought about by a high carbohydrate, low fat mixture. This is explained by the antagonism between fermentation and putrefaction; the increased putrefaction due to the excess of fats decreased the fermentation, and consequently the formation of fatty acids. The conclusion may be drawn from the experiments that a certain amount of fatty acid is necessary for digestion.

T. WOOD CLARKE.

THERAPEUTICS.

ROSENSTERN, J.: RECTAL INSTILLATIONS IN PYLOROSPASM. (*Deutsch. med. Woch.*, January 6, 1910, p. 31.)

The author has been making use of rectal injections of salt solution in cases of pylorospasm for two years. This was at first done merely to supply the fluid need of the vomiting infant. The saline, consisting of Ringer's solution, was injected through a syringe so arranged that about 30 to 40 drops were injected per minute. This was done twice daily for two hours at each time. In the 4 cases so treated the result was an immediate cessation of the vomiting. These results are in accord with the animal experiments, which have shown that rectal injections of saline reduced the secretion of hydrochloric acid into the stomach.

T. WOOD CLARKE.

BETHGE, HANS: A CONTRIBUTION TO THE TREATMENT OF MENINGOCOCCUS CARRIERS. (*Deutsch. med. Woch.*, January 13, 1910, p. 66.)

In the orphan asylum at Gelsenkirchen an epidemic of meningitis occurred in which 9 children were attacked by the disease. An examination of the nasal secretions of the 187 inmates of the institution showed that sixty of these were meningococcus carriers. These were isolated in one part of the hospital and an investigation undertaken to ascertain the best method of ridding these people of their organisms. The patients were divided into groups of about 10 each, and the nasal cavities of each group were irrigated or treated with pyocyanase, peroxid, serum, protargol, salt solution, or were left untreated. The investigation showed that the treatment with peroxid following thorough irrigation with saline was a thoroughly successful means of ridding the nasal cavities of the meningococci. From 60 to 70 per cent. of the cases were freed of the organisms by one such treatment, and the other after a very few repetitions.

T. WOOD CLARKE.

HOHMANN, GEORG: THE TREATMENT OF THE EARLY STAGE OF ACUTE ANTERIOR POLIOMYELITIS. (*Münch. med. Woch.*, December 7, 1909, p. 2,508.)

In the early stage of anterior poliomyelitis there is often marked hypersensitiveness of the spine lasting from one to two or more weeks. This can be completely relieved by putting the patient in a plaster jacket. Whether this treatment is merely

palliative or has also a therapeutic effect upon the later course of the disease cannot yet be said. T. WOOD CLARKE.

INFANT FEEDING.

BICKEL, A., AND ROEDER, H.: THE QUESTION OF LACTALBUMIN IN INFANT FEEDING. (*Berlin. klin. Woch.*, January 3, 1910, p. 8.)

The question was attacked by two series of experiments. The first was a feeding experiment on a litter of 8 puppies. All were allowed to suckle. Two of them were used as controls; to three was given a definite daily dose of a soluble salt of lactalbumin; to the other three was given an equal amount of casein. The three receiving the lactalbumin gained most rapidly in weight, and the three that were given casein most slowly. The same conditions were maintained when the mother's milk was replaced by cow's milk. The second series of experiments was carried out on a dog with a duodenal fistula. Here it was found that when woman's milk, plain water, or diluted cow's milk with the addition of lactalbumin was given to the dog, it emptied its stomach in about sixty minutes. On the other hand, a cow's milk solution of the same dilution, but without the addition of lactalbumin, required ninety minutes to pass through the stomach. Furthermore, the appearance of the duodenal contents after feeding cow's milk with an excess of lactalbumin was indistinguishable from that after woman's milk was given, the fine flocculent coagulum being in marked contrast to the tough curds seen after the cow's milk alone was given. The results have been applied to a series of infants that could not retain cow's milk. When an excess of lactalbumin was added the children took the food well and gained rapidly. T. WOOD CLARKE.

PERIER AND GAUJOIUX: QUELQUE INDECATIONS PRATIQUES CONCERNANT LA RATION ALIMENTAIRE DU NOURRISSON. (*Annales de Méd. et Chirurg. Infant.*, March 15, 1910.)

The writers have made a table of the amount of food taken by babies based upon a theoretical foundation. The child is supposed to nurse 10 grams per nursing during the first day of life. He takes 10 grams more per nursing each subsequent day for seven days, and then takes 10 grams more each month for five months. They admit that there are exceptions to their rules.

Fritz B. TALBOT.



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6

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ORIGINAL COMMUNICATIONS.

SOME PROBLEMS OF NUTRITION IN EARLY LIFE.*

BY FRANK SHERMAN MEARA, PH.D., M.D.,

Professor of Therapeutics in the Cornell University Medical School
in New York City.

PART I.

It has long been assumed, and on that assumption we have based many procedures in feeding, that the gastrointestinal functions in infancy are but imperfectly developed.

Since the work of Pawlow and his pupils in these latter years on the sequence of events in adult digestion, added zest has been given to investigation in this direction in infancy.

Histological investigation had warranted the supposition that the salivary glands were active in infants† and, indeed, such was

* The Jerome Cochran Lecture, read before the Medical Association of the State of Alabama, April 20, 1910.

† Czerny-Keller, "Des Kindes Ernährung."

found to be the case even in the newborn, in whom it was demonstrated that a saliva capable of converting starch into sugar was secreted immediately after birth.* It would seem, too, that the selective action of saliva, shown by Pawlow, probably obtains in infants, the amount of water, proteid and mucus being determined by the substance taken into the mouth, whether useful, injurious or indifferent. No inconsiderable amounts of saliva are secreted at this age, as one experiment showed that 5 c.c. was swallowed on the ingestion of 100 c.c. of milk.†

The close similarity in the histology of the stomach in the infant and in the adult would connote an efficiency of function in the former as well as in the latter and all the ferments of the one are found in the other.

The lab-ferment or rennin exists in the secreting cell as pro-chymosin and is converted into the active rennin by HCl. Pepsinogen, the mother substance of pepsin, is formed by the cells to be activated also by HCl. A more recent contention is that rennin and pepsin are one.‡

HCl and even free HCl is found in the newborn. The latter appears in breast-fed children one and a quarter to two hours after feeding and amounts to .1 to .2 per cent.§ In artificially fed children free HCl appears a little later, in two to two and a half hours.

Free HCl even in the strength found in infants exerts antiseptic powers, and is capable of detoxicating bacterial and vegetable toxins. In the adult HCl is apparently able to split cane sugar, but this action in the infant has not been investigated.

Lipase, capable of splitting neutral fat into fatty acids and glycerine, as in adults, has been found in the newborn as early as the second week and in greater quantities than in the adult. One experiment showed that in twenty-four hours in the test tube 5 c.c. of gastric juice with 10 c.c. of egg-yolk emulsion split off 22 per cent. of fatty acids.¶

It is a question whether the lipase acting in the stomach is derived from the stomach or regurgitates from the duodenum. The question is not settled for the adult, but numerous findings make it probable that a gastric lipase actually occurs in infants.

* Uffenheimer, "Physiologie des Magen-Darmkanales beim Saeugling und älteren Kind, Ergebnisse der Innere Medizin und Kinderheilkunde," Vol. II.

† Tobler, "Ueber die Verdauung der Milch in Magen. Ergebnisse der Innere Medizin und Kinderheilkunde," Vol. I.

‡ Uffenheimer, *loc. cit.*

§ Cherry-Keller, *loc. cit.*

¶ Uffenheimer, *loc. cit.*

Pawlow's wonderful contributions to the processes of digestion show that there are two kinds of gastric secretion: (1) psychic; (2) chemical.

Psychic secretion is the first and is initiated by stimuli passing by one or more of the five senses, impinging on the brain and reflected thence by way of the secretory nerves to the secretory glands or originating in the brain in association of ideas, memories or imagination giving rise to the appetite; hence, the term used by the Germans for this secretion, *Appetit-saft*.

These secretions may be influenced, too, in a negative sense by psychic processes, such as anger, fright and pain, which inhibit the output.

Lavenson has well said that "this dependence of gastric secretion on psychical processes and stimuli permits the formulation of the statement that appetite is the emotional expression of the group of phenomena of which the secretion of gastric juice is the physical expression."*

The chemical stimuli arise from the food within the stomach, operating not by contact, mechanically, but through the chemical properties of their solutions, and there is no more interesting chapter in Pawlow's work than the selective action of food stuffs on gastric secretion.

In the infant the act of sucking initiates the secretion.

To follow the chain of secretions into the intestinal canal, we find, even in the newborn, the substance secretin, first described by Starling and placed by him in a group of bodies having kindred functions, which he named "hormones."

Prosecretin, the mother substance, is present in the mucous membrane of the duodenum and is converted into secretin by the action of the HCl of the gastric juice; the secretin is then absorbed into the blood, carried by it to the pancreas, which it incites to activity. The pancreas, too, reacts to psychic stimuli.

The peculiar ferments of the pancreatic juice, tryptic, diastatic and lyptic have all been demonstrated in the infant. The tryptic ferment exists in the secretion as a proferment, trypsinogen, and is activated in the intestinal canal by enterokinase, a ferment derived from the mucous membrane of the intestinal canal, which is itself called out by the action of the pancreatic juice. The function of trypsin is, as is well known, to form albumoses

* Lavenson, "Observations on a Child with Gastric Fistula in Relation to Recent Advances in the Physiology of Gastric Secretion," *Archives of Internal Medicine*, Vol. IV., No. 3, 1909.

and peptones from proteid and to split these and those derived from gastric digestion into amido-acids.

Lipase or steapsin exists in the pancreatic juice as a zymogen and is activated by a constituent of bile. This activating substance of lipase has not been proven in infants, as yet.

The amylolytic ferment of the pancreas, diastase or ptyalin, identical in its action with the ptyalin of the saliva and of which no proferment seems to exist, is present in infants and breaks down starches through dextrins to maltose. Maltose is further changed by another ferment maltase into glucose, and this latter has been demonstrated in infants.

The activity of both glycogenic and urea forming functions have been demonstrated in the livers of infants. The flow of bile is incited by the contact of albumoses and fat with the mucous membrane of the duodenum. The bile activates the zymogen of steapsin and reinforces its action to split fats into fatty acid and glycerin, while at the same time it renders the fatty acids soluble and increases their absorption.

In abundant fat feeding, the pylorus opens and regurgitation of bile, pancreatic juices and intestinal juices into the stomach occurs.

The important ferment erepsin, extracted from the mucous membrane of the small intestine by Cohnheim, is also present in the infant. Its function is to break the peptones and albumoses down completely into amino-acids. It does not act upon native proteids, except upon casein and that slowly, but completes the action of the proteolytic ferments of the stomach and pancreas. It is seen, then, to stand in the same relation to these ferments as maltase does to the other amylolytic ferments whose end product, maltose, it still further converts into glucose, the form in which sugar is absorbable.

Not only do the intestinal juices afford these two important ferments, maltase and erepsin, but also a series of others, among which is lactase. This ferment splits milk sugar into glucose and galactose and exists in the intestinal juices of the infant. It affords us another point of great interest, inasmuch as it is proven to disappear when milk as a food is stopped and to reappear when milk is later adopted as a diet, thus illustrating perfectly the principle of the adaptability of ferments to foods. Invertin, which splits cane sugar into glucose and fruit sugar, has been demonstrated in the infant, and is found even in the fetus of the cat and

dog. Nuclease, splitting nucleinic acid, a lipase and arginase are also of this group.

It will be seen, then, that so many of the important ferments of the intestinal canal have been demonstrated that Czerny and Keller's statement that all of the ferments of the intestinal canal are present in infants is undoubtedly true, and that Uffenheimer's statement that there exists from the earliest life the possibility of breaking down starches, milk sugar, cane sugar and maltose may remain unquestioned.

Secretions of Brunner's glands and of the large intestine have not been investigated in infants.

Pawlow's name will ever be associated with the marvelous play of the digestive processes, the selective response of the secretions and the interaction of the ferments, but with the phenomena of motility of the alimentary canal, the new conceptions of peristaltic action, the name of the American physiologist Cannon stands pre-eminent. It would take me too far afield to go into this subject farther than as it touches upon certain important points in the gastric digestion of milk, to which I shall come back presently.

It has been shown how the series of proteolytic ferments all operate to break proteid down into crystalline products, into "bausteine" as the Germans picturesquely call them, but whether proteid must all be so broken down to be absorbed or whether albumoses, peptones and peptids may also pass the intestinal canal is yet to be decided.

Carbohydrates can be absorbed only as simple sugars. All double sugars have to be split in the intestine. For grape sugar the assimilating power increases up to the end of the first year, when it is as great as it is in adults. Different sugars, like different salts, have different rates of absorption. Milk sugar has an absorption rate less rapid than other kinds.*

Fat is split into glycerin and fatty acids and saponification occurs. Whether any unsplit fat as emulsion is absorbed is not yet determined even for adults.

The stools of the infant have been of especial interest to the practitioner, and there are many current misconceptions to be corrected, to which I shall return. It may be said here that the chief constituent is the secretions from the intestinal canal and that the usual food in normal conditions is almost completely absorbed.

* Uffenheimer, *loc. cit.*

This is especially true of sugar and proteid, but fat in the shape of soaps, neutral fat and more particularly fatty acids is always found, up to 4 and 5 per cent., even in the breast-fed.

Whether the functions of the intestinal canal would be better carried out in the absence of bacteria might be interesting knowledge, but hardly practical, as the intestine is never free from bacteria after the first ten to twenty hours of life, but it does make a great difference to the proper functioning of the intestinal canal what bacteria predominate in it.

In a general way the organisms present give rise to two very different processes, fermentation and putrefaction; the latter should be quite absent in healthy infants.

The distribution of these organisms in the intestine is not a lawless one but quite typical. In the small intestine *bacillus coli* and *bacillus lactis aerogenes* predominate; in the cecum *bacillus bifidus* and *bacillus coli* and in the colon and rectum *bacillus bifidus*. These three organisms form acids and these acids form an unsuitable medium for bacteria of the putrefactive type. Their distribution is probably determined by the bactericidal action of the intestinal secretions, the presence of oxygen in the upper intestine and the products of their own action. Most of the bacteria are killed by an "autotoxemia," *i.e.*, by the products of their own growth exerting an inhibitory effect or more probably through the exhaustion of the media and the bactericidal action of the body of the child communicated through the intestinal wall.

Milk proteids resist putrefaction, and milk sugar, of which there is a high content in woman's milk, encourages the acid fermentation, hence the absence of putrefaction in a healthy breast-fed child.

Putrefactive processes are more marked in hunger stools. It may be added that only 5 per cent. to 10 per cent. of the bacteria in feces can be made to grow on ordinary media.*

We will now take a hasty glance at some of the interesting facts recently elicited with reference to the preparation of the natural pabulum to be submitted to these digestive processes.

The development of the breasts depend on the functions of the ovaries, as stasis in the development of the breasts of young females who have been castrated show. Moreover, in animal experimentation transplantation of ovaries into females previously castrated initiates the growth of the breasts. The growth im-

* Czerny-Keller, *loc. cit.*

pulses of the breasts, then, in puberty and the menstrual changes in the breasts are dependent upon substances which are elaborated in the functioning germinal glands.

Cramer reports an exceedingly interesting case of his own, in which he transplanted the ovaries of a woman in her seventh pregnancy (the patient was suffering from osteomalacia) into another woman who had never sexually developed, never menstruated and whose ovaries were undeveloped, with the result that she began to menstruate and her breasts develop.*

The hyperplasia of the breast which occurs during pregnancy, however, seems to be due to entirely different causes. The woman whose ovaries were removed by Cramer went on to full term and nursed her infant at the breast. From this it results that the ovaries have no influence upon the hyperplasia of the breasts during pregnancy or upon the milk secretion after pregnancy.

The substances responsible for the growth of the breasts during pregnancy are apparently elaborated either in the placenta or in the fetus. There is evidence that after the death of the fetus, under certain conditions, the substances formed in the placenta are capable of maintaining this hyperplasia, but Starling's experiments of injecting into virgin rabbits the juice of ovaries, uterus and placenta showed these substances to be absolutely inert, but injection of the juice of the embryo caused hyperplasia of the breasts similar to that seen in the early stages of pregnancy.† Starling believes that the effects on the breast are called out by a specific hormone, elaborated in the fetus and carried through the fetal and maternal circulation to the breasts, where it exerts an "assimilatory or inhibitory" influence, which inhibition, removed with the termination of pregnancy, "determines the spontaneous breakdown of built-up tissues, *i.e.*, activity, which in these cells is expressed by the formation of milk."

The hyperplasia of the breasts during pregnancy, with inhibition of milk and the swelling of the breasts with lactation during the puerperium, can hardly be attributed to a single cause.

Cramer believes that the act of sucking has a very significant influence on the function of the mammary glands and insists that when the breast seems to fail after childbirth the putting of the child to the breast should be insisted on for a long time; for

* Cramer, "Zur Physiologie der Milchsekretion," *Munchener Medizinische Wochenschrift*, July 27, 1909.

† Starling, "The Chemical Control of the Body," Harvey Lectures, 1907-8, Lippincott.

it has been shown that after a long interruption of nursing the breast may be made to functionate again by the act of sucking.

It would seem to me advisable, when the breasts seem to fail because the child will not take hold well, if the opportunity affords, to put an older child upon the breasts to develop lactation.

We are all familiar with the gross differences between woman's milk and cow's milk. We know that each contains fats, carbohydrates, proteids and salts; that cow's milk will average about 4 per cent. fat, 4.5 per cent. sugar, 3.5 per cent. proteids and .78 per cent. salts; and that mother's milk averages 4 per cent. fat, 7 per cent. sugar, 1.5 per cent. proteids and .2 per cent. salts.

But these are averages and have a very limited value for mother's milk, which varies greatly in individual cases, especially as to its fat content, and varies also depending on whether taken before or after the child has been to the breast, whether taken from the right or left breast, on the time of day and on the stage of lactation. Hence the unreliability of analyses of single samples of mother's milk.

We know also that the relation of the different proteids to each other differ. In woman's milk albumin and casein are nearly equal, while in cow's milk as 1 to 6.

We have been much concerned in the past about the proteids, recently about fats, now, with Finkelstein's new views, about the carbohydrates, and presently we shall be much concerned about the salts. But way beyond these things we are glimpsing subtler facts, a consideration of which make us feel that our present efforts at adapting foreign milks to the infant digestion and assimilation are gross and clumsy. We see that the fats vary in their content of volatile and unsaturated acids; that the proteids differ in something more than is determined by our coarse chemical methods; that they have a "biologic stamp," a something that marks them as appropriate for, indeed, as a part of, the species from which they are derived and for which they were designed; that the salts have in them all the intricacies of the physico-chemical processes, which are at the foundation of metabolic changes; that the milk contains ferments that have bactericidal value that aid in digestion and in assimilation, and of these things we know next to nothing, but, undoubtedly, much will shortly be revealed.

Among the recent investigations of interest along this line of

difference between the two milks is one by Schwartz into the physical conditions of the fats.*

He points out that a microscopic examination of cow's milk shows that the fat globules are, for the most part, rolled together in heaps and clumps, only a few moving about singly or in pairs.

Now when this milk was sterilized it was noticed that the division of the fat globules was a more regular one, the clump formation being smaller and that the clumps did not roll together as in raw milk. Finally, when woman's milk was examined it was found that this clump formation failed entirely and that there was a regularly divided field of fat globules.

The fat globules are surrounded by a zone of clearer substance, which the author calls periglobular substance, which in cow's milk has a certain stickiness or viscosity that is absent in woman's milk. Still more interesting was the difference in elasticity of the periglobular substance. In cow's milk it is easily overcome and the mere laying of a cover glass on a slide of cow's milk will overcome this elasticity and cause the flowing together of adjacent globules. This does not obtain in mother's milk, in which the elasticity is very great. The heating of the cow's milk increases the elasticity of the periglobular substance in cow's milk and may account for the easier handling of such milk by some infants.

The author believes that the elasticity of raw cow's milk is so slight that the mere act of sucking from the bottle, by the pressure it exerts, impairs the emulsification. The nature of this periglobular substance is not known, though casein seems to share in it to some degree.

Even more fruitful of possibilities of a practical nature are the results of recent studies of Alexander and Bullowa† on the protective action of colloids of milk. These workers call attention to a few fundamental facts of the physical chemistry of colloids, which, while well known to students of this subject, may bear repeating to a body of medical men in consideration of its application to the study of milk. When finely divided particles of powder are examined under the microscope they are seen to have that trembling motion called Brownian movement. This movement is not sufficient to keep the particles in suspension, but when

* Schwartz, "Ein Beitrag zu den Unterscheiden zwischen Kuh und Menschenmilch," *Jahrbuch für Kinderheilkunde*, Vol. LXX., No. 4.

† Alexander and Bullowa, "Protective Action of Colloids in Milk, with Some Ultramicroscopic Observations," *ARCHIVES OF PEDIATRICS*, January, 1910.

these particles undergo still finer subdivision, passing out of the range of the microscope and visible only to the ultramicroscope, and, indeed, approaching molecular dimensions, their range of motion is so great that they no longer settle to the bottom. They are then said to be in colloidal solution. When this subdivision goes still farther, to molecular dimensions, or even to ionization, then they are in what is called crystalloidal solution.

Some colloids, like gelatin and gum arabic, are insensitive to electrolytes and are capable of dissolving again after dessication. These are called reversible or stable colloids. Others are readily coagulated by electrolytes, but cannot be redissolved after dessication. These are called irreversible or unstable colloids.

An interesting property of reversible colloids is that they can protect irreversible colloids from coagulation and permit them to redissolve after dessication. Such action is known as "protection" and a reversible colloid exhibiting it as a "protective colloid." This protective action is specific and may be exhibited for one substance and not for another.

Casein is an irreversible coagulating colloid and lactalbumin is a reversible or protective colloid.

When these facts are applied to milk we begin to get a light on differences in different milks that gross chemical reactions have failed to explain.

The exercise of this protective function will depend, then, on the proportion of those two colloids in milk; hence the differences in coagulation of mother's milk with its ratio of casein to lactalbumin of 1 to 1 and that of cow's milk with its ratio of 6 to 1, when subjected to HCl or to rennin.

The protective action in cow's milk can be increased by adding a small quantity of such protective colloids as gelatin, gum arabic and cereal gruel. All this gives a scientific explanation for what empiricism had taught us long ago.

The authors made an interesting study of the size and appearance of the particles in cow's and woman's milk, demonstrating the tendency to formation of larger particles in the former; also demonstrating the incipient coagulation caused by heating cow's milk and by agitating it.

Another point bearing on our universal custom of diluting cow's milk was the observation that under these conditions the visible particles were less numerous and farther apart and the tendency to coagulation was delayed.

Moreover, they noted that when gelatin was added to cow's milk before it was submitted to the coagulating effects of the electrolyte HCl, the coagulation was delayed or entirely avoided. In the same way the action of rennin was delayed.

Sodium citrate, which has of late years been used to some extent to increase the digestibility of milk, has the same action, and the authors' observations seem to place it in the class of protective colloids rather than electrolytes.

This effect of protection is not confined to casein, but probably is extended to fat and is important in maintaining the emulsion.

The protective colloids prevent the curds from becoming tough and leathery in the stomach; and as the process of coagulation must be reversed in the process of digestion, it is more difficult in the absence of protective colloids, if, indeed, it is possible.

Having considered on the one hand some of the facts recently elicited bearing on the preparation of the food of the infant and some of the later studies of its properties, and, on the other hand, the highly elaborate mechanism that awaits its advent into the digestive tract, let us take a hasty view of what happens when milk, either woman's or cow's, is ingested.

The curding or coagulation of milk begins within two or three minutes after the food reaches the stomach and is completed in ten minutes. This formation of the curd is a very important physiologic process, which serves, in the first place, to separate the solid from the fluid portions of the milk, and, secondly, to prepare this solid portion for digestion.

When I say "a very important physiologic process," I cannot better justify the emphasis used than by quoting Tobler's remark: "Pediatrics has trodden a remarkable path. For the past ten years it has led the struggle with every means at its command against rennin in the infant's stomach, whose only function many writers look upon as that of doing injury to the digestive tract. According to them the child had best come into the world without rennin ferment. For years the sum total of infant dietetics was the prevention of the physiologic curding. Since the teaching of the indigestibility of cow's casein has fallen to the ground, the chief argument for the procedure has become illusory. The last theoretical prop has now fallen. We no longer have any ground whatsoever for finding the idea of cow's milk curding in the stomach as it does in a test tube as almost terrifying," and he adds wisely and perhaps somewhat caustically, "It would be

much more proper to seek to find the purposefulness of a physiologic process of which we have no cause to doubt."

The first function of curding, the separation of the fluids from the solids, begins at once, the whey passing on into the duodenum, leaving the solid curd behind. This process is completed in the course of a half hour. In this way the carbohydrate, that is, the milk sugar, in solution is the first to leave the stomach, while the casein and fat remain.

The fundal portion of the stomach closes down upon the curd, bringing the mucous membrane into contact with the food, the gastric juice thus acting first upon the periphery of the curd. As the latter goes into solution the fundus follows down upon the remaining nucleus, the whole process being completed in the case of mother's milk in one and a half to two hours, while in the case of cow's milk it requires some three hours. This difference in the time of digestion required for the two milks has a very practical bearing on the frequency of feeding in infancy.

The digestion of the casein is completed and it passes into the duodenum before the stomach frees itself of fat, so that the order of digestion and evacuation into the duodenum is whey, casein and fat.

The proteid is denatured by the action of the gastric juice in which the HCl shares; that is, it loses those properties upon which its identification by biologic methods depends.

Albumoses and peptones have been found in the stomachs of infants, but amido-acids have not. As has been said, a considerable amount of fat-splitting goes on in the stomach. There appears to be some absorption from the stomach. It is estimated that the amount of gastric juice poured out in the course of a milk meal is about equal to the amount of the milk ingested; that is, an infant of one year taking a liter of milk during the day secretes one to one and a half liters of gastric juice, all of which is reabsorbed.

The motility of the stomach and the operation of its valves are extraordinary mechanisms, the elucidation of which we owe largely to Cannon's classical observations. The stomach is functionally divided into two distinct portions—the fundal and pyloric portions. The cardiac end of the fundus is in a condition of relative rest, closing down upon the curd, and acting as a passive reservoir. In the fundus begin gentle wave-like movements of peristalsis which run along two-thirds its length, deepening as

they go to the antrum pylori. The function of this movement is to urge along the food liquefied by the process of digestion toward the pylorus, allowing the mucous membrane to come in contact with the solid food remaining.

At the beginning of the antrum pylori the circular band of muscle becomes thicker, and by its forcible contraction divides the stomach into the two portions mentioned. The antrum pylori displays a different form of motility from the wave-like peristalsis of the fundus, namely, an intermittent strong contraction which forces the liquefied products of digestion into the duodenum.

Still more interesting is the series of reflexes operating the opening and closure of the cardiac and pyloric valves.

These reflexes are determined by the reaction of the stomach contents. In cats it has been demonstrated by the X-ray that as long as the stomach contents remain alkaline a rhythmical regurgitation takes place into the esophagus, whose own peristalsis forces it back into the stomach again. As soon as the stomach contents react acid the cardiac orifice closes and the regurgitation ceases. This may operate as a safety valve when the stomach is over-distended, or, as Mosenthal* has suggested, may explain the regurgitation of milk in healthy infants and need not in every instance be due to excessive feeding or overdistention.

The pyloric valve is affected by reverse conditions. While the stomach contents are alkaline it remains closed, but opens when they become acid.

The behavior of the pyloric valve is determined not only by chemical conditions, but also by mechanical, for solid particles in contact with the valve produce a closure, thus preventing undigested masses passing into the intestine. Of course this does not mean that solid particles may not eventually pass the pylorus, but it means that their tarrying in the stomach is much prolonged, and is a large factor in determining the difference in time of digestion of the tougher cow's curd and the softer woman's.

But a reflex even more dominant is operative on the duodenal side of the pylorus. Acid contents of the duodenum close the valve, while alkaline relax it. When the contents are acid on both sides it is the duodenal reflex that determines the reaction of the valve. When bile and pancreatic juice again render the duodenal contents alkaline the pylorus opens. Mechanical pres-

* Mosenthal, "Gastric Capacity of Infants," ARCHIVES OF PEDIATRICS, October, 1908.

sure on the duodenum by voluminous contents again results in closure of the valve. The play of reflexes on the two sides of the valve and on the cardiac orifice are nicely adjusted to each other to give each organ its proper share of work and proper time to perform it.

Another fact of practical importance, to which our attention has recently been called, though described by Wilson Philip* nearly a century ago, is the layer-like arrangement of the food in the stomach. When solid food is taken, the last particles ingested displace the food that has preceded it toward the periphery, thus occupying the nucleus of the mass; but with milk the opposite arrangement obtains; for the first milk drunk is coagulated and the next portion flows about this curd and is coagulated about it in turn, like the layers of an onion. As the gastric juices affect the food at the periphery first, it happens that by too frequent feeding of milk the curd at the nucleus remains untouched by the gastric juice indefinitely. This curd at body temperature furnishes an excellent culture medium for bacteria, and it has been shown that milk having a bacterial count of 10,000 per c.c. when fresh, afforded from the nucleus of the curd kept undigested in the stomach by too frequent feedings, after nine and one-half hours, a count of 16,500,000. Moreover, irritating volatile fatty acids are elaborated by the action of these bacteria. This layer-like arrangement of food in the stomach and the digestion from the periphery put another interpretation on the finding of solid food in the stomach some time after a meal, which is often looked upon as evidence of indigestion. It also explains the discrepancies in test meals. I shall touch upon the bearing of this fact upon the intervals of feeding later.

Cohnheim, of Heidelberg, has shown that when water is imbibed it does not mingle with the solid food in the stomach, but a runnel is formed by a horseshoe-shaped band of muscle along the lesser curvature, from the cardia to the pylorus, and is quickly discharged into the duodenum. The anatomist, Kaufmann, has described such a bundle of muscle tissue which might well subserve this purpose. If this be true, another fear, that of diluting the gastric juices by drinking water after a meal, is laid at rest.

Fat in the food tends to delay the digestion of proteids in the stomach, while carbohydrates hasten it. Dilution of milk facili-

* Lavenson, *loc. cit.*

tates the digestion up to a certain point, 50 per cent. being the optimum.

If we may judge by the examination of cats and dogs killed at different stages of digestion, the reduction of solid food in the stomach is very complete. In the upper half of the intestine macroscopically recognizable remains of curds are rarely seen. The duodenum seems only to be bedewed with strongly acid fluid. This acid reaction extends through about one-half the length of the small intestine. Lower in the intestine the fluids are more voluminous and take on the color of milk stools. Beyond the ileocecal valve the picture changes abruptly. It looks, as Tobler puts it, "as if there was by some physicochemical change a precipitation out of the fluid contents of the small intestine," and in the lower part of the small intestine the contents take on the characteristics of the stool.

Cannon has shown that there is a striking difference in the functions of the proximal and distal portions of the large intestine. In the ascending and transverse colon peristaltic and antiperistaltic movements keep the contents here longer than anywhere else in the intestine, thoroughly kneading them and permitting of profound bacterial action.

The lower part of the large intestine is the site of true stool formation.

(To be continued in July.)

TREATMENT OF EPISTAXIS.—In the majority of cases of nose-bleed the bleeding comes from the anterior portion of the nasal cartilage, and can be checked by the application of adrenalin or by cauterization with trichloroacetic acid or the galvanocautery. If not successful, the nose may be packed with iodoform or stypticin gauze. In many cases the bleeding point can be compressed in this way without completely occluding the passage. The use of Bellocq's cannula should be reserved as a last resort, as the instrument is very likely to cause injury, with secondary inflammation. The ears must be very carefully watched, and with the first signs of reddening of the drum membrane the packing must be removed. Thus, O. Mayer (*Muench. Med. Woch.*, 1909, No. 43) has seen several cases of otitis media with mastoiditis, and also empyema of the antrum after the use of Bellocq's cannula.—*Merck's Archives.*

THE RESULTS OF SUBSTITUTE FEEDING IN PREMATURE INFANTS.*

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In this study of premature infants I am indebted to Dr. Rotch for permission to use the records of the Infants' Hospital and of the Children's Hospital. The managements of both institutions are planning to erect new buildings. One of the problems to be solved in connection with these plans is the provision which shall be made for the care of infants prematurely born. I have attempted to find out what have been the results of the present methods of treatment employed in the last fifteen years, hoping that some suggestions might be made for future requirements, or that some figures may be available for comparison with results obtained under new and better conditions.

The need for a well equipped ward for the reception and care of premature infants cannot be judged fairly by the number of cases which have been admitted in the past. With our limited number of beds many more cases are refused admittance than are accepted. There is no class of patients that requires more skilful nursing and careful feeding, and for the majority of poor, and even moderately well-to-do, people, the expense of proper home treatment is almost prohibitive. One is occasionally surprised to see how well a premature baby will do under simple home conditions with unskilled attendance; but the great majority of such cases among the poor in this country die from lack of proper care, whereas the statistics of certain foreign workers—notably those of Budin—show an extraordinarily low mortality among those who are reared in incubators and fed on breast-milk.

In this series I have purposely selected my cases in so far that I have excluded babies who entered the hospital so long after birth as to have passed the period of prematurity, as such infants belong naturally to the class of difficult feeding cases. I have also thrown out all cases in which there was definite evidence of diseases or conditions incompatible with normal development, such as congenital syphilis, spina bifida, congenital heart disease, erysipelas, etc. I have, however, included all those whose vitality had been greatly lowered during home treatment, who died soon after they were admitted to the hospital.

* Read before the Twenty-second Annual Meeting of the American Pediatric Society, Washington, D. C., May 3, 1910.

The method of caring for premature infants has been practically the same at both the Infants' Hospital and at the Children's Hospital for the last fifteen years. The babies have been brought by the parents, without any supervision on the part of the hospital, and doubtless many of those who died soon after entrance had been improperly cared for at home previous to entrance, and were insufficiently protected from exposure on their journey from their homes to the hospital. With the exception of the period from 1895 to 1900 at the Infants' Hospital—to which I shall refer later—the babies have all been given oil baths, wrapped in quilted cotton jackets, and placed in padded cribs, with hot-water bottles to maintain the body temperature. The food has been almost without exception some form of modified milk; rarely a mother has supplied one or two feedings of breast-milk daily. The nursing has always been conscientious and skilful—the high mortality which has prevailed under this method of treatment cannot, I believe, be in any way attributed to lack of care. There has been no systematic isolation of the premature infants into separate wards, as our accommodations did not permit such an arrangement.

At the Infants' Hospital there were included in this series 95 cases, of whom 58, or 61 per cent., died; 24, or 25.3 per cent., lived and gained in weight; 13, or 13.7 per cent., lived but were discharged either losing in weight or making no gain. Of the last mentioned group many were taken home because of their condition and probably died, so that the ultimate mortality was undoubtedly considerably more than 61 per cent.

In the Children's Hospital there were 30 cases included in the series. Of these, 24 died, giving a mortality of 80 per cent., and 6 lived and gained in weight, a percentage of 20. The mortality was therefore nearly 20 per cent. greater at the Children's Hospital than at the Infants' Hospital. This difference is probably accounted for by the fact that no infant was discharged while losing in weight and condition. All were allowed to remain in the wards until their condition warranted treatment at home, or until they died.

The combined results of treatment at the Infants' Hospital and at the Children's Hospital, in reference to total mortality was as follows:—

Total Number of Cases.	Lived.	Per Cent.	Died.	Per Cent.
125	43	34.4	82	65.6

When one compares this record with Budin's experience in four years' service at the Clinique Tarnier, in which 579 premature infants were treated with a mortality of only 10.2 per cent., one is impressed by the high mortality rate prevailing under a system in which breast milk has not been employed in the feeding. It is necessary to bear in mind, however, that Budin's very low mortality of 10.2 per cent. is due in part to the fact that the great majority of his premature infants weighed over 2,000 grams at birth; whereas, in the series here reported only 10 infants, or 9 per cent., weighed at birth over 2,000 grams. If we compare Budin's mortality in infants weighing from 1,200 to 1,500 grams, and again those weighing from 1,500 to 2,000 grams, with a similar series at the Infants' and Children's Hospitals the results are less unfavorable, although still inferior to Budin's experience. This is shown in the following table:—

TABLE I.

Weight.	Died.
1,200-1,500 grams	71.9 per cent., at the Infants' and Children's Hospitals.
“ “ “	60.0 “ “ at the Clinique Tarnier, 1898.
1,500-2,000 grams	44.2 per cent., at the Infants' and Children's Hospitals.
“ “ “	13.2 “ “ at the Clinique Tarnier, 1898.

As shown in the above table Budin's results were nearly 12 per cent. better than ours in infants weighing from 1,200 to 1,500 grams at birth, while in the class weighing from 1,500 to 2,000 grams his mortality was 31 per cent. better than was obtained at the Infants' and Children's Hospitals.

The mortality in all cases over 1,200 grams at birth treated at the Infants' and Children's Hospitals is shown in Table II.

TABLE II.

Showing the mortality in reference to the birth weight. When birth weights were not known the first weighing made after entrance to the hospital is assumed to be the birth weight.

INFANTS' HOSPITAL.						
Weight in Grams.	Living and Gaining Weight.		Living but Losing Weight.		Died.	
	No. Cases.	Per Cent.	No. Cases.	Per Cent.	No. Cases.	Per Cent.
1,200 to 1,500	5	20.8	3	23.7	17	56.7
1,500 to 1,800	11	45.8	3	23.7	5	16.7
1,800 to 2,100	6	25.0	5	38.3	7	23.3
Over 2,100	2	8.4	2	15.3	1	3.3
	<hr/>		<hr/>		<hr/>	
	100.0		100.0		100.0	

CHILDREN'S HOSPITAL.				
1,200 to 1,500	1	16.7	6	37.5
1,500 to 1,800	4	66.6	6	37.5
1,800 to 2,100	1	16.7	2	12.5
Over 2,100	—	—	2	12.5
	<hr/>		<hr/>	
	100.0		100.0	

In this series of cases no infant survived who weighed less than 1,200 grams. Infants weighing from 1,500 to 1,800 grams on entrance showed the greatest viability, judged by the percentage that lived and gained in weight. The explanation probably lies in the fact that the smaller the baby the sooner it was taken to the hospital after birth, the larger babies often being kept at home for two, and even three weeks, or until the failure of home treatment became manifest.

TABLE III.

Showing mortality in reference to the period of gestation.

INFANTS' HOSPITAL.				
	No. Cases.		Died.	No. Cases.
	Living.	Percentage.		Percentage.
Unknown	4	10.8	12	20.
6 months	0	—	8	13.
7 " "	21	56.7	34	58.
8 " "	12	32.5	4	00.7

CHILDREN'S HOSPITAL.				
	No. Cases.		Died.	No. Cases.
	Living.	Percentage.		Percentage.
Unknown	—	—	2	6.6
7 months	6	20.	21	70.
8 " "	—	—	1	3.4

Two deductions of value only can be drawn from the above table. First, in neither hospital did any infant in the sixth month of gestation survive; and, second, the percentage of infants in the seventh month who lived was nearly twice as great as those of the eighth month. It should be stated in this connection that the number of eighth month babies was comparatively small, and it is doubtful if the data as to the period of gestation can be relied upon, owing to the lack of dependence to be placed upon the statements of the parents in the class from which the infants were taken. The facts are consistent, however, with the view generally held, that premature babies of seven months are more likely to survive than those born prematurely at eight months.

In connection with the weight of a premature baby in relation to its viability, the following table is of interest, showing the length of time extremely small infants may live:—

TABLE IV.

1.	Weight—Grams.	Age at Entrance.	Lived after Entrance for
1	570	4 days	2 days
2	670	2 hours	6 hours
3	680	11 days	3 days
4	690	15 hours	48 hours
5	835	14 days	24 “
6	890	12 hours	27 days
7	930	24 “	8 “
8	940	17 days	7 “
9	940	9 “	2 “

In regard to the use of incubators, our experience is very limited. From 1895 to 1900 it was the custom to place most of the premature infants at the Infants' Hospital in an incubator, but the hospital records are not explicit upon this point, and one cannot be sure how many were treated in padded cribs by preference. The mortality during this period was in 25 cases 80 per cent.; whereas, from 1900-1905, when the incubator was discarded, it dropped in 43 cases to 58 per cent., and in 1905-1910 to 46 per cent. Some conclusions as to the advantages or disadvantages of incubators over padded cribs might be had by comparing the results obtained in hospitals in which padded cribs are used, and where breast milk is given as food, with our mortality in Boston, where padded cribs and modified milk have been

the method of treatment. Unfortunately, I have no such data for comparison. It does not seem possible to draw any positive conclusions in regard to the relative merits of incubators and padded cribs from the temperature charts, as there is obviously a limit to which outside heat can be depended upon to maintain the internal temperature of the body, when the cause of variations in bodily temperature lies in disturbed metabolism. If general impressions are of any value, one would infer from the temperature charts of the cases studied that the method of padded cribs and heaters is efficient in providing the necessary outside heat; at the same time it has the distinct advantage of allowing one to regulate to a considerable extent the moisture and temperature of the air which is inspired, and greatly simplifies the problem of nursing. High as our mortality at the Infants' Hospital is today, it is distinctly lower than in the years when an incubator was in use. At the same time one must admit that we have had no experience whatever at either hospital with a modern incubator.

There does not seem to be any reason to believe that the inspired air should be at the same high temperature as that with which the body is surrounded. This is the objection which may be raised to all incubators. On the other hand, the padded crib, as we have used it, does not provide sufficient circulation of air, and one cannot help feeling that the baby breathes in too much of its own exhalations.

The incubator chambers—such as have been constructed by Bosi and Guidi in Venice, and Escherich in Graz—have much in their favor. The temperature and moisture of the air can be regulated in reference to the conditions suitable for aeration. But as different babies require different degrees of temperature to prevent the loss of body heat, further measures must be adopted to prevent loss of heat in individual cases. It would seem as if the thermo-pad, recommended by Dr. Holt, especially if made in the form of a sleeping-bag, would make it possible to keep several babies in the same incubator chamber at different temperatures, without altering the quality of the air which they breathe.

There is the utmost need of some convenient and expeditious way of transferring the patient from the house to the hospital without undue exposure. The wretched condition in which some babies arrive has convinced me that one cannot trust to the parents to provide suitable means of bringing the baby to the hospital without undue exposure and loss of vitality, especially in

cold weather and when the distance is great. The best of hospital nursing and feeding is made useless in the end simply by the journey to the hospital. It should be the duty of the hospital itself to supervise the transportation of the baby. This can be arranged without an elaborate or expensive ambulance service. I would suggest that a portable receptacle should always be in readiness to send by express or by an automobile to the infant's home at the time the admission to the hospital is granted. The delay in sending the receptacle would be more than compensated for by the better condition of the baby when it arrived. A well padded basket with a cover, lined with hot water bottles, and containing a quilted gown in which to wrap the baby, could easily be provided and would serve its purpose. We have had no provision of this kind in Boston. The means of keeping the baby warm, and at the same time providing air to breathe, have been left to the parents. Judged by the condition in which many babies have arrived, the results have been deplorable.

Of the 82 cases who died, 20, or nearly one-fourth of the number, died within twenty-four hours, 7 within two days, and 11 within three days. Thirty-eight died within one week, 6 within two weeks, 6 within three weeks, 9 within four weeks, and 19 at varying periods over four weeks.

The possibility of materially lowering the mortality by providing proper means of conveying premature infants to the hospital would therefore seem to be very great.

The babies who died were on the average ten days old when admitted, and averaged 1,547 grams in weight. Those who lived and gained in weight were sixteen days old and averaged 1,750 grams in weight. Those who lived and lost in weight were seven days old and averaged 1,847 grams in weight. Judged by averages, therefore, those who were kept longest at home before being brought to the hospital were the ones who responded most readily to treatment. This may possibly be due to the fact that those babies were fed on breast-milk for longer periods and had a better start when it came to the point of providing substitute feeding.

The effect of substitute feeding in the care of premature infants must be judged not only by the mortality statistics, but by its influence upon the weight development. It is very clear, I think, from the results which I have tabulated, that the mortality under a system of substitute feeding is much greater than in

cases in which breast-milk is used for food. An interesting question arises as to how favorable were the results of substitute feeding in the cases discharged as well and gaining in weight.

The average gain in weight of the 6 infants discharged as well from the Children's Hospital was 45 grams per week, practically $1\frac{1}{2}$ ounces. At the Infants' Hospital, in 24 cases, the average weekly gain in weight was 50 grams, practically $1\frac{3}{8}$ ounces. This represents very fairly the rate of growth one may expect in premature infants who survive and who are fed under the most favorable conditions of modified milk feeding for the first two or three months. The average number of days each child remained in the hospital was seventy. The cases were, therefore, under observation long enough to allow one to draw conclusions as to the effect of substitute feeding.

It is interesting to note the caloric value of the food given in relation to the gain in weight. For this purpose calculations of the energy quotient have been made in 11 of the cases that lived and gained in weight. In 6 cases, in whom the weekly gain was practically the same, the energy quotients varied from 72 to 137. One infant, taking a food which gave an average energy quotient of 72, made an average weekly gain of 73 grams. Another, with an energy quotient of 79, gained only 2 grams a week. The absence of any definite relation between the energy quotient and the gain in weight is very striking, as shown in Table V.:

TABLE V.

Showing the average energy quotient in 11 infants who lived and gained in weight.

	Average Energy Quotient.	Average Weekly Gain in Grams.
1.	137	68
2.	133	77
3.	85	70
4.	92	70
5.	72	73
6.	127	68
7.	129	91
8.	79	2
9.	163	47
10.	80	34
11.	80	29

The average energy quotient in these 11 cases who survived and gained in weight was 107.

The energy quotients in 18 cases that died at the Children's Hospital were also calculated, and are tabulated as follows:—

TABLE VI.

	Average Energy Quotient.	Average Weekly Gain or Loss in Weight in Grams.
1.	26	— 40
2.	64	— 119
3.	81	— 159
4.	27	— 13
5.	79	— 149
6.	39	— 126
7.	66	+ 20
8.	28	— 25
9.	71	+ 20
10.	32	— 60
11.	70	— 119
12.	54	— 45
13.	80	— 53
14.	156	— 42
15.	65	— 301
16.	109	— 43
17.	98	+ 157 (?)
18.	60	— 43

One might infer from the above figures that the infants in this group were, as a whole, underfed; yet there is no relation between the energy quotient and rate of loss in weight. Cases numbered 1, 12, 14, 16, 19, all lost from 40 to 45 grams per week, and their energy quotients were respectively 26, 54, 156, 109 and 60.

In some cases the very low energy quotient is to be explained when one understands that all infants on admittance were put on a very weak food and small quantities. Those that died within a few days or weeks could not be worked up to the average energy quotient of those infants who lived for two or three months.

Briefly stated, one may draw the following conclusions from

the study of 125 premature infants, treated without incubators and fed upon careful modifications of cow's milk:—

(1) The total mortality was 65.6 per cent. in 118 out of the 125 babies weighing under 2,100 grams at birth.

(2) No infant weighing under 1,200 grams at birth survived.

(3) No infant in the sixth month of gestation survived.

(4) The smallest baby admitted weighed 570 grams at birth and lived 6 days.

(5) The possibility of materially lowering the mortality by providing proper means of conveying premature infants to the hospital is very great.

(6) Premature babies who survived gained on an average only 50 grams a week on modified milk, for an average period of 70 days each.

(7) The average energy quotient of the food of 11 cases who lived and gained in weight was 107.

(8) There was no definite relation between the energy quotient of the food and the weekly gain in weight.

(9) Modified milk, however, carefully administered and supervised, must be considered an unsatisfactory food for premature infants, and should be used only when breast milk cannot be obtained.

(10) Hospitals planning to receive premature infants should make ample provision for the maintenance of wet nurses.

(11) The relative value of padded cribs and incubators could not be accurately judged, as modern incubators have not been used at either the Infants' or the Children's Hospital in Boston.

ESOPHAGEAL STENOSIS OF DIPHTHERITIC ORIGIN.—Danielsen (*Ann. de Méd. et Chir. Inf.*, November 15, 1909) adds a third case to the two recorded in the literature. The patient was a child who had had diphtheria the previous year. Soon after, she began to regurgitate all fluid nourishment. The writer found that a sound was stopped 30 (?) cm. from the teeth. X-ray examination, combined with bismuth emulsion, demonstrated several strictures at different levels. Esophagoscopy confirmed the diagnosis. Treatment with bougies and injections of thiosinamin was successful in relieving the stenosis.—*American Journal of Surgery.*

ACIDIFIED MILK IN PEDIATRIC PRACTICE.*

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The peasants of Holland were the first to feed their infants buttermilk; this practice dates back about 150 years. Articles by De Jager¹ and De Matos,² two Holland physicians, brought the subject forcibly before the medical profession. In 1901 and 1902 the pediatricians of Germany began its use. Baginsky,³ of Berlin, after having used buttermilk in 300 cases, speaks without reserve, in glowing terms, of its virtue. He concludes his article by recommending this food as a life-saving preparation in acute dyspepsia after the initial starvation treatment and chronic diarrhea. While Baginsky confined its use to the sick infant, Morse⁴ also administered it to the healthy infant with satisfactory results.

While abroad in 1902 and 1903 I had the opportunity of seeing buttermilk used in the clinics; the results were all that could be desired. On my return to this country I was loath to feed such an appearing mixture to infants. I could not overcome my prejudices.

From time to time numerous articles on buttermilk have appeared in the literature, some commending it; then, again, authorities are found who are just as profuse in their words of condemnation of this method of infant feeding. Recently Kerley⁵ reported very discouragingly on the use of milk soured with tablets containing a pure strain of the lactic acid bacilli. This food was administered to 34 difficult feeding cases and in a series of 19 cases of diarrheal diseases, all inmates of a hospital. He found it necessary in the difficult feeding cases, owing to the disastrous results obtained, to stop the procedure, but thought that in the intestinal cases the method accomplished something.

La Fétra,⁶ while disappointed with the use of acidified milk, had satisfactory results with the use of fat-free buttermilk in intestinal cases. Foul and putrid stools changed for the better and

* Read before the St. Louis Medical Society, January 15, 1910.

assumed a not unpleasant odor. He prefers to change to some other food when the stools become normal.

Buttermilk has long been considered, owing to its content of lactic acid bacilli, as unfavorable and inhibitory to the growth of other micro-organisms; even virulent typhoid bacilli,⁷ diphtheria and tubercle bacilli are said to lose their virulence in a few days after being added to the buttermilk. This, and the fact of its easy digestibility, has made it a favorite prescription with many physicians in a wide variety of pathologic conditions. A few of the text-books on pediatrics now make mention of buttermilk as a remedy in the diseases of infancy.

Holt⁸ considers it a valuable food in intestinal indigestion and in diarrheal disease. According to his directions a quart of buttermilk is to be cooked for twenty minutes with two tablespoonfuls of barley flour and 4 ounces of water, and later two teaspoonfuls of cane sugar are to be added. He considers the good results are attributable to the low fat, presence of lactic acid and the change brought about in the milk proteid. This is about the formula which has been employed in Germany and for which such good results have been obtained. Wheat flour, however, is used instead of the barley flour. Necessarily, the favorable results have not been attributed to the lactic acid bacilli, as the food has been first subjected to heat before its administration.

In view of the fact that Tissier⁹ *in vitro* found that the lactic acid bacillus had an inhibitory action on the bacillus perfringens, an organism which he found present in fermental diarrhea, and proceeding along this line actually fed his patients pure cultures of the lactic acid bacillus, it would seem that cooking the buttermilk is not only superfluous, but would actually diminish the favorable results. Dunn¹⁰ is very enthusiastic over the results he obtained with milk mixtures containing the living lactic acid bacilli, in cases of fermental diarrhea. In keeping with the advance made in this country with percentage feeding, he orders a certain per cent. of fat, proteid and sugar, which the case would seem to require, and this formula is inoculated with the lactic acid bacillus which is allowed to ripen. Commercial buttermilk is skim milk containing about one-half per cent. lactic acid, to which its sour taste is due. The casein, instead of being in combination with calcium as it is in sweet milk, is in the form of the lactate, the calcium being set free forms salts, which are soluble. The stools of infants fed on buttermilk have certain character-

istics; they are alkaline in reaction and never contain curds. Some mucus may be present if there is a pathologic condition of the large intestine, and, what is very striking, a complete absence of odor. The color is usually a golden yellow. Green stools are seldom seen.

Buttermilk is taken greedily by young infants. Infants ten to eleven months of age at times object to its taste, but usually in a short time acquire a desire for it. Children of one and one-half to two years of age frequently absolutely refuse to take it. In the fall of 1907 Dr. Clemens and I decided to give buttermilk a trial. Commercial buttermilk cooked with flour and sugar added was used for about two months, but for many reasons it was displaced for acidified milk. In the first place it was very difficult to get buttermilk regularly, and we did not desire one day to have an infant on buttermilk and the next day on modified milk. There has always been difficulty in getting a good article of buttermilk fresh every day. If twenty-four hours old it should not be given to an infant. In a private home, where it is only necessary to provide sufficient buttermilk for one infant, the best results will be obtained by having the mother prepare it fresh every day. Cream is allowed to sour by standing in a warm place for twenty-four hours; this process may be hastened by adding a "starter." It is then churned and the butter removed. In Germany it is possible to obtain a condensed buttermilk which is put up in tins much like our condensed milk. All that is necessary is to add water. Kassel¹¹ and Koppe¹² have had very satisfactory results with this. After two months' experience with the buttermilk we were satisfied that if it were possible to get a fresh article and not one that is considered and handled as a waste product, which is often the case, our results would be satisfactory.

Our experience with acidified milk extends over a period of two years. We have used it very extensively at St. Ann's Infant Asylum, where about 400 infants have received this food.

He whose experience is confined to the infant in private homes has absolutely no idea of the difficulties which are met with caring for an infant artificially in an institution. Our wards are spacious and the ventilation good, but still we are not able to provide for each infant the necessary 1,000 cubic feet of air. Given an infant of average weight and digestive organs, which have not been upset by injudicious feeding, it is seldom the case that the experienced pediatricist has difficulty in getting that infant to

thrive. In institutions, however, owing to the crowding and unhygienic surroundings, infants have great difficulty caring for the fats and proteids of cow's milk. It must be understood that there is a distinct difference between buttermilk and acidified milk. Commercial buttermilk has always been cooked with a cereal and is almost fat-free. Some have recommended the addition of fresh cream in order to raise the fat percentage. Acidified milk contains the living lactic acid bacillus; any percentage of fat desired may be fed and it has not been churned.

The two products cannot be considered identical, though the results obtained clinically seem to be identical. Kerr¹² has used lactic acid milk in 96 cases; he thinks the acidified milk has a distinct advantage over buttermilk. His results were very favorable and he considers it of very definite value in difficult feeding cases where the various modifications of milk are not well borne; also in fermentative, eliminative and chronic diarrheas.

In 1906 and 1907 the various methods of feeding approved by the leading pediatricians of the country were put into use. Percentage feeding, split proteids obtained by using mixtures of cream and whey, milk and cereal combinations, low fat and relatively high proteids, mixtures obtained by using skim milk all in turn received a trial. Infants would gain up to a certain point and then hospitalism would manifest itself by green stools and diarrhea. In the cold months we were able to exclude infection as the cause of the trouble, and our usual explanation was deficient digestive power, to which were added fermentative changes due to the depressing effects of the surroundings. In the summers of 1906 and 1907 we had epidemics of gastroenteric intoxication. They began in the latter part of July and continued up to the cool weather of September. For this we blamed the milk supply and the effects of the extreme heat. In the spring of 1908 our acidified milk was well under way; many of our infants had passed through the first two months and had been transferred to modified milk. We were dreading the effects of the excessive heat of oncoming summer. In July, about the time we expected our cases of milk poisoning, our babies were put back on acidified milk diluted with equal parts of barley water. These infants ranged in ages from two months to sixteen months. The experiment was a complete success. We went through the summer without an epidemic, and this past summer, which has been as hot as St. Louis has ever experienced, we had the same

result. As a prophylactic in diarrhea the usual recommendations in days of excessive heat are less fat in the prescription, more water and a diminution in the amount of milk for twenty-four hours. Also some form of sterilization of the milk. I have never seen mention of acidified milk in this connection and believe the recommendation of its use as a preventive of gastroenteric intoxication is something new. In hot weather our milk is first boiled before being inoculated. In preparing the acidified milk the fresh milk is inoculated with the lactic acid bacillus and then allowed to ripen for twenty-four hours by standing in a warm room; it is diluted with barley water to the desired strength, and in order to raise the caloric value to the needs of the infant a tablespoonful of cane sugar is added to the quart of the mixture. For young infants one part acidified milk, two parts barley water, a tablespoonful of cane sugar to the quart of the mixture was ordered. Older infants received one-half and two-thirds acidified milk with barley water; malt sugar has also been used in place of the cane sugar when the gain in weight was not satisfactory.

Where there was an intolerance of fat, skim milk was used. A failure to gain in weight with good digestion was met by the use of top milk. From the first our results were striking; young infants two days old received this seemingly irrational food. Our infants thrived on this food, and we had many more successes than we had with the split proteids. I can remember the time when one-half the babies in a ward would have green stools; now green stools are seldom seen.

It will be to no advantage to give a long series of case reports; suffice it to say that a large number of the babies who received this food were perfectly healthy; then again cases of malnutrition and intestinal indigestion also received this food. Our results were far superior to any which we had at any previous time. It was especially gratifying to see the effect in cases of intestinal indigestion with large quantities of mucus in the stools, the so-called mucus disease of Eustace Smith. The stools rapidly became normal and all mucus disappeared. Infants fed on other food who showed colic were very amenable to this food. We have not ordered this food in private practice for well babies, it not being necessary. There is considerable prejudice among many mothers against this food. It certainly has anything but a palatable appearance and the idea of giving such a sour con-

glomeration to a little baby is not especially appealing. Acidified milk being practically a predigested food, the stomach and bowel are required to do little or no work in its disposal. The question has frequently been raised whether or not it would be troublesome to return to a modified milk diet. We have had no trouble from this score when a little care was taken and the first formula made somewhat weak. We do not keep our infants on buttermilk indefinitely, as we believe the digestive organs will go on to better development if they are given more work. We certainly prefer, however, in summer time, to keep our infants on acidified milk and have them stay well, even at the risk of having them under weight, then to feed sweet milk with the danger of gastroenteric intoxication.

We believe from our experience that acidified milk fills a long felt want in the institution feeding of infants. Pure air, however, is indispensable and the larger the ward and the fewer babies in that ward the greater the success with any method of feeding. Young infants at birth may with advantage be placed on this food. Thrush and other forms of stomatitis are seldom met with in infants receiving this food. The development of scurvy and rickets need never be feared. Acidified milk places at the disposal of the infant the casein in the form of the lactate, which is so necessary for the growth and development of the infant, in an assimilable form and in a sufficient quantity. The lactic acid bacillus and the lactic acid certainly seem to prevent the development of intestinal indigestion, as the babies on this food almost invariably have good stools. It seems that the infant when receiving acidified milk mixtures is in a better position to care for the fats, and that a larger percentage of fat may be fed than when on the usual modified milk mixtures. The casein in acidified milk being in the form of the lactate is not affected by the rennin. We desire to emphasize the rarity of curds in the stools of infants receiving acidified milk mixtures even when top milk mixtures are employed. We do not by any means wish to be understood from this fact to advise the use of these high fat percentages in the early weeks, as fat diarrhea and fat intoxication must be reckoned with. From our observations it would seem that fat alone, and proteid alone, are not responsible for the curds in the stools of infants fed on cow's milk; for their production it would seem that the fats require the presence of the proteids and that both acting together we have the very familiar

curdy, mucous stool; the latter due to a secondary catarrh from the irritation of the former. This reasoning seems close at hand when it is considered what occurs in acidified milk feeding. The proteids are in the form of very fine particles, especially if the acidified milk has been well agitated, not coagulable by rennin; therefore, its deleterious influence on the fats is removed, hence the normal stools.

In conclusion, it may be said that, in order to be successful in feeding acidified milk, it is necessary to be well grounded in the principles of infant feeding, and that this method does not furnish a short route to this goal. The good results seem due not alone to the low fat, to the presence of lactic acid and to the chemical change of the proteid, but the presence of the lactic acid bacillus plays a very definite rôle.

In private practice cases of malnutrition, intestinal indigestion and diarrhea should have this food. Finally, would we make a special plea that the city infant during the days of excessive heat, the latter part of July and August, especially, receive the advantage of this food.

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6. *ARCHIVES OF PEDIATRICS*, 1909.
7. Rubinstein. *Archives für Kinderheilkunde*, 1902, Vol. LV., p. 157.
8. *Diseases of Infancy and Childhood*, 1909.
9. *Annals de L' Institut. Pasteur*, 1905, Vol. XIII., November, 1899.
10. *ARCHIVES OF PEDIATRICS*, April, 1907.
11. *Deutsche Med. Wochenschrift*, 1904, Vol. XXXI., p. 917.
12. *ARCHIVES OF PEDIATRICS*, January 19, 1909.

Mathieson (*The Lancet*, November 20, 1909) reports an investigation on a series of 80 cases of diphtheria, in 9 of which there were signs and symptoms occurring on about the twelfth or thirteenth day, due, according to him, to a streptococcal invasion of the throat, which he considers distinct from the diphtheria itself. He discusses the work of other men on this subject. The "thirteenth day" symptoms were: Punctate erythema, albuminuria, sore throat, joint pains, diarrhea and fever.—*Boston Medical and Surgical Journal*.

CONGENITAL OBLITERATION OF THE BILE DUCTS, WITH REPORT OF A CASE.*

BY ELIZABETH L. PECK, M.D.,
Philadelphia, Pa.

In 1892 John Thomson, of Edinburgh, published a monograph giving an analysis of 50 cases of this condition, collected from the literature of the last century, and including a case of his own. No cases seem to have been reported before 1801. Prior to Thomson's monograph, White, of Boston, reported 18 cases which he had collected, and other synopses have been made by Giese in 1896 and Skormin in 1902. Lavenson, reporting an autopsy made on a case of J. P. Crozier Griffith, gives a number of additional cases in 1908, the most recent summary that I have found. Since then I have seen a report of 1 case by Dr. James Miller in the Reports of the Society for the Study of the Diseases of Children of London, and a report in the *Tribuna Medica* of Rio de Janeiro, 1908, by Gurgel. The entire number of cases reported to date is less than 70.

The symptoms in these cases begin soon after birth, and, while there are variations in the course of the disease, the general resemblance is striking. From the ordinary icterus neonatorum these cases are distinguished by the more marked and persistent jaundice, the deeply bile-stained urine, and the usually colorless feces following stools of ordinary meconium. Very few of these babies reach six months of age, and at least one-third of the number die within the first two weeks. Death is preceded by emaciation, a deepening jaundice, sometimes vomiting and convulsions, and, in more than 50 per cent., by hemorrhage from various organs. Physical examination during life shows often enlargement of the liver and spleen.

Postmortem, the liver is frequently much enlarged, tough, and sometimes bile-stained, and there is complete obliteration of some part of the hepatic, common, or cystic ducts, or of the gall bladder; while the blood vessels, with very few exceptions, show no change. Other organs are usually jaundiced. The spleen is often

* Read before the Anna E. Broomall Club, May 25, 1909.

large. Microscopically, the liver tissue shows a condition of biliary cirrhosis more or less marked, sometimes round-celled infiltration in some areas, and small dark granules due to fragments of inspissated bile in some of the smaller bile ducts. Some portion of the ducts is found consisting of fibrous tissue only.

The family history in these case is generally negative. The parents are often healthy, and other children in the same family are generally healthy. Thomson mentions three instances where 2 children in the same family suffered from the same disease, but two of these examples were surely syphilitic, and the conditions may have been an instance where the influence of syphilis produced changes similar to those which we are considering.

That the condition is not, in the majority of cases, due to syphilis is proven by the fact that, in the whole series, with the exception of 5, there is no history of syphilis; often there is a distinct statement that it is not present. There are none of the ordinary symptoms of congenital syphilis, nor are there the pathologic findings of syphilis in other organs at autopsy.

The character of the labor in the majority of the reported cases was normal. A few of the infants have been premature, but the large majority have been stated to be of normal appearance and well developed at birth. A rather large proportion of the number have been males.

The case I shall report occurred in my service at the Woman's Hospital. John Fredericks, born at 7 P.M., October 19, 1906, was an apparently healthy, well developed baby, 3,180 grams. The mother was a healthy Irish woman, twenty-eight years old, but rather depressed, as her husband had died of tuberculosis six weeks before the birth of this child. She had one healthy child. Her first labor was instrumental and difficult. This labor was terminated normally, after a rather slow first stage, and the mother was in good condition. The baby nursed well, and the stools were normal in appearance. The second day the child was slightly jaundiced and the urine somewhat bile-stained. By the third day the jaundice had increased, and on the fourth day it was intense. The child refused to nurse and the mother's milk was fed to him. He occasionally gave sharp cries of distress, and a pink stain of urates was found on the diaper. He vomited a little and was very listless. The urine was more deeply bile-stained. The temperature, which had not been above 100°F., rose to 103°F., but returned to 100°F. on the 24th (fifth day). With the in-

crease in jaundice on the third day, calomel and soda was given in divided doses, and potassium citrate for the concentrated urine. Later only stimulation was attempted.

On the afternoon of October 25th (sixth day) the child suddenly grew worse, with shallow respirations, a pulse of 200, temperature 102.4° F. He rallied after stimulation, and during the next two days retained mother's milk in small quantities.

Early on the 28th, a slight oozing of dark blood began from the cord, and a little later bile colored fluid began to flow. This continued all day in gradually increasing amount. The child died at 6:35 P.M., just at the close of the ninth day.

AUTOPSY, OCTOBER 29TH, 12 M.

The autopsy findings were as follows: Body of infant emaciated and jaundiced, weight 2,400 gm., postmortem rigidity present. Cord dry and clean.

Thymus gland large, no parietal adhesions. Extends to level of upper border of heart.

Lungs deeply jaundiced, posterior part of lower lobe of right lung shows small pneumonic area.

Heart normal in size, cavities normal.

Round ligament from liver to umbilicus pervious.

Gall bladder small, white and empty, cystic duct impervious—other ducts pervious.

Liver pale, normal in size and appearance.

Kidneys small, not congested, pelves of kidneys jaundiced.

Stomach distended with gas, mucous membrane injected, very little food present. No obstruction at pylorus. Bowels collapsed. Appendix jaundiced and full of feces.

MICROSCOPIC FINDINGS.

Liver.—Overgrowth of connective tissue seen on surface and septa extending down into the liver, with spots of round-celled infiltration in the connective tissue.

Small bile ducts compressed.

Liver cells very cloudy and colored green with bile.

Spleen.—Connective tissue increased.

Spleen pulp destroyed, contains degenerated cells and pigment granules both dark brown and yellow.

Splenic follicles fairly good.

Kidneys.—Show some cirrhosis.

Diagnosis: Biliary cirrhosis with congenital obliteration of the bile ducts.

The cause of this condition has been a source of much discussion among those who have studied the clinical history and the pathology of these cases.

Thomson says, in the preface to his monograph: "When we find Nature herself practicing experimental pathology, it is well worth our while to investigate as fully as we can the conditions under which she works and the results of her experiments." He concludes that probably a congenital malformation is the causative factor, either narrowing of the ducts beginning early in intrauterine life, and later causing cirrhosis by interfering with the outflow of bile, or causing some catarrhal condition of the small hepatic ducts, which, by inflammatory process, causes adhesion and obliteration of their lumen, and he attributes to the process of cirrhosis the more severe symptoms as of a type of blood poisoning, and believes that in those children who live longest the cirrhosis is of later development; and while the outflow of bile into the intestine may be hindered, the liver is still able to perform its more important functions.

The fact that the onset of jaundice does not begin until some hours or days after birth, is explained by taking into account the effect of the very great change in the hepatic circulation, which occurs at birth.

This hypothesis of anomaly in development is carried still farther by Lavenson, who holds the view that the obliteration or atresia of the ducts, as he prefers to call it, is primary and the cirrhosis a result of biliary stasis. He bases his opinion on the method of development of the liver, as follows:

The earliest fetal evidence of the liver and bile ducts is a solid cord that grows out of the gut tract at three weeks; this forms the bile tracts later. In a short time it is entirely detached from the intestine; this first budding forms in its proximal end the hepatic ducts; a second budding forms the ductus choledochus, which joins the former. These offshoots are called the fibers of Remak, and are solid cords, the formation of a lumen being a later step in development. Chapin, writing in Keating's "Encyclopedia of the Diseases of Children" in 1890, also holds this view.

This would scarcely explain those cases in which normal meconium is passed in the early stools, if there has never been a communication between the liver and the intestine.

Rolleston, in his treatise on diseases of the liver, gall bladder and bile ducts, states his belief that the cirrhosis is the primary lesion. This cirrhosis, started by poisons conveyed from the mother to the liver of the fetus, is followed by a descending cholangitis. To this process, as it descends, is due the jaundice and the obliteration of the larger ducts; it is an obliterative cholangitis analogous to obliterative appendicitis.

Many points may be discussed as bearing on the truth or fallacy of these two theories regarding the origin of this rather rare disease.

There would seem to me to be more than one explanation for the origin of these cases, and Dr. J. P. Crozier Griffith inclines to this opinion.

Certainly the case which I have reported, in which only the cystic duct was wholly occluded—though it is true that ducts which are pervious postmortem may not be freely open during life—in which bile must have reached the duodenum during the entire illness, and in which death occurred early with marked cirrhosis of liver, spleen and kidneys, seems more readily explained by a theory of infective or irritative origin.

Two points in the case I have reported seem to me of interest; the flow of bile-stained fluid through the round ligament or umbilical vein, and the condition of the appendix.

The diagnosis of the condition during life is more or less difficult—the differentiation must be made between this disease, simple icterus and various septic processes. The treatment is most unsatisfactory. A few cases have been operated upon, and operation is suggested as a resource. Possibly in some of the older cases the idea might be considered; but the outlook at present would seem most unfavorable.

THE IMPORTANCE OF THE EARLY RECOGNITION OF TUBERCULOUS MEDIASTINAL GLANDS IN CHILDREN.—Allan (*The Lancet*, October 16, 1909) believes that tuberculosis of the bronchial glands should be considered as pulmonary tuberculosis and given the same treatment. He believes that all children showing signs or symptoms of a tuberculous process, whether or not any signs can be found in the lungs, should be given rigorous treatment.—*Boston Medical and Surgical Journal*.

STUTTERING.*

BY E. W. SCRIPTURE, PH.D. (LEIPZIG), M.D. (MUNICH),

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"Stuttering" and "stammering" are terms applied to a disease whose most striking symptoms consist of cramps or excessive tension of the organs connected with speech. These cramps may show themselves in spasmodic contractions of the lips, as in the case of the captain who gave the order, "Ready! Aim! F-f-f-f-f-shoot! confound you." They may show themselves also in the cramps of the breathing muscles, as in the case of one of my friends, who, in the middle of a sentence, would suddenly become speechless with a cramp of the abdominal muscles. We were obliged to sit in silence for a minute at a time. He could not speak on account of his cramp and I could not on account of politeness.

Stuttering is essentially a mental trouble—a psychoneurosis—arising from a compulsive idea. Dr. Johnson was compelled to touch every post that he met in his walks. Some children are compelled always to step off with a certain foot. Stutterers are compelled by the thought of speaking to tighten up all their muscles of speech so that they move stiffly or get into cramps.

Stutterers have no difficulty in singing, because they have no compulsive idea connected with the thought of singing. Most of them can speak perfectly in a dialect for a similar reason.

The cure of stutterers has to proceed on the principle of training them to speak in some new way. Since this way is free from the compulsive idea, they do not stutter while they are using it. The simplest new way is merely to sing what you want to say; as long as you sing you will not stutter. This is, however, an impracticable procedure, for the stutterer wants to speak, not sing.

Other new ways are: to drawl the vowels, to speak while beating time, to speak in a hollow voice, to speak very slowly, etc., etc. These are the methods of the "stammer schools." They are effective in that for a short time the patient can speak in an odd way with more or less success. When the result is permanent, it usually leaves the patient with some vocal oddity. The cure is rarely permanent, however, because the patient naturally tries

* Read before the meeting held under the joint auspices of the Public Health Education Committee of the Medical Society of the County of New York and the Hygienic Committee of the New York City Federation of Women's Clubs, at the New York Academy of Medicine, March 17, 1910.

consciously or unconsciously to get rid of his oddity, that is, of the very thing that is curing him.

There is, in my opinion, only one form of cure that is scientific. It consists in teaching the patient to speak in perfectly normal voice. To the stutterer this is a "new voice," just as odd to him as singing or any of the queer ways of speaking. The moment he speaks in a normal voice he ceases to stutter because he is freed from his compulsive idea.

The most constant abnormality in the stutterer's speech is stiff laryngeal action. This laryngeal stiffness may be broken up by the "melody cure." The stutterer is taught to speak so that his voice constantly rises and falls through an octave. At first he does it awkwardly and he will probably object to using this queer method of talking. His attention is called to the fact that I have been running over an octave all the time while talking to him, and that my voice is a perfectly normal one. As he becomes more expert, he runs up and down the octave just as I do and acquires a normal voice.

The reason why the melody cure is so effective is that in running over the octave the person passes from the set of muscular adjustments required for the chest register to an entirely different set required for the head register. This breaks up his laryngeal cramp and with the laryngeal cramp the other cramps are lost also. This principle of stopping stuttering by constantly breaking up the cramp is an entirely new one. I have been using the melody cure for a long time, but it is only lately that I have found the reason for its effectiveness—namely, that it involves the change in the system of muscular adjustments.

PANCREATIC CYST IN AN INFANT.—W. H. M. Telling and J. F. Dobson (*British Journal of Children's Diseases*, May, 1909). The earliest period of life at which a pancreatic cyst has been recorded was six months. The position of the cyst in the mid-abdomen is the one which is recognized. In the author's case (child of nine months of age), the situation in which the cyst presented itself, its mobility, the fact that it could be traced directly to the pancreas, and that it was free from all other structures, made its origin quite certain. The absence of ferments in the fluid has been conclusively shown to be of not infrequent occurrence in certain pancreatic cysts. The child was successfully operated upon.—*Archives of Diagnosis*.

CASEIN CURDS IN INFANTS' STOOLS. BIOLOGIC PROOF OF THEIR CASEIN ORIGIN.

BY FRITZ B. TALROT, M.D.,
Boston, Mass.

*(From the Department of Serum Diagnosis,
Harvard Medical School.)*

L. F. Meyer and J. S. Leopold have recently written two articles, which appeared in the ARCHIVES OF PEDIATRICS,* † in which they endeavored to show that the protein in *tough curds* in infants' stools is not casein. They maintained that the chemical



*Photo by Dr. L. S. Brown,
Pathological Laboratory, Massachusetts General Hospital.*

CASEIN CURDS, ACTUAL SIZE.

Note the variation in size and shape. The surface of some is smooth and of others indented in many places. These curds were picked out of the stools of dyspeptic babies.

examinations of these masses does not prove that they contain casein, and concluded, therefore, that they are not casein. They felt that it was necessary to explain these masses in some manner or other, and apparently agreed with Langstein, who says that "this protein could very well come from the intestinal secretion." They do not, however, give any proof that it comes from the in-

* ARCHIVES OF PEDIATRICS, 1909, p. 773.

† ARCHIVES OF PEDIATRICS, 1910, p. 126.

testinal secretions or from anything else; and they leave the question hanging with the statement that tough curds are not casein. The importance of this question and its bearing upon infant feeding caused the writer to undertake further work on the subject, because if casein comes through the intestinal canal undigested it is fair to assume that too much casein in the food may do harm, as does too much fat or sugar. Clinically, *tough curds* in the stools are relatively infrequent, while *soft fatty curds* are very common. A detailed description of *tough curds* will not be given in this paper because the writer has already described them several times.* † ‡ Suffice it to say that they are tough, often look very much like beans, and vary in size and shape. The accompanying photograph shows several of these tough curds which have been picked out of the stools of babies suffering from indigestion.

The following investigation was undertaken under the supervision of Dr. Frederick P. Gay, and to him the writer is deeply indebted for his help and suggestions. The problem was first to obtain a specific precipitin for cow casein and second to test the suspected material to determine whether it gave the same reaction as cow casein with the anti-cow casein serum.

Gengou§ found that alexin is fixed by rabbit milk serum with both casein and lactoglobulin; it is not fixed with lactalbumin; the precipitating property of the serum parallels the sensitizing property. He obtained a distinct precipitate by adding casein or lactoglobulin to the specific serum. Hamburger¶ obtained from rabbits a specific precipitin for casein which differentiated it from lactalbumin.

The writer first prepared pure cow casein and human casein according to the following method quoted by Gengou.||

Milk was diluted with three volumes of water and precipitated with 0.1 to 0.2 per cent. acetic acid. The resultant precipitate was redissolved with ammonia 1-200, and reprecipitated four times with acetic acid. The dry casein was then extracted with alcohol and ether. Lactalbumin was obtained by precipitating the casein and lactoglobulin from milk by saturating with magnesium sulphate. Lactalbumin was then precipitated from the clear filtrate with acetic acid and washed. It was then dissolved

* *Boston Medical and Surgical Journal*, January 11, 1908.

† *ARCHIVES OF PEDIATRICS*, December, 1909.

‡ *Boston Medical and Surgical Journal*, February 3, 1910.

§ Bordet and Gay, "Studies in Immunity," p. 252.

¶ *Wiener klin. Woch.*, 1901, p. 1,202.

|| Bordet and Gay, "Studies in Immunity," p. 252.

in weak sodium hydrate, reprecipitated and dissolved several times. The fresh tough curds, which I shall designate as "suspected material," were first washed thoroughly with $\frac{1}{10}$ per cent. acetic acid. The mass was then dissolved with weak sodium hydrate and reprecipitated with acetic acid. After six reprecipitations this precipitate was extracted with boiling alcohol. The cow casein was dissolved in Adler's solution.* This solution was not used in the precipitation tests because it did not give a clear solution. The materials tested were dissolved in weak NaOH, which gave a clear solution. The rabbits were immunized at four day intervals, the first two injections of 5 c.c. and 3 c.c. were subcutaneous and the last two, 3 c.c. each, were intravenous. They were bled ten days after the last injection. The following experiment was performed with this serum and the solutions of casein and lactalbumin.

EXPERIMENT I.

Nor. salt sol. 1 cc.	Anti-cow casein ser. 5/10 cc.	5/10% NaOH 1/10 cc.	Clear. No sediment 24°.
Nor. salt sol. 1 cc.	Anti-cow casein ser. 5/10 cc.	Cow casein sol. 1/10 cc.	Very cloudy 4°. Slight sediment 24°.
Nor. salt sol. 1 cc.	Anti-cow casein ser. 5/10 cc.	Human casein sol. 1/10 cc.	Clear. No sediment 24°.
Nor. salt sol. 1 cc.	Anti-cow casein ser. 5/10 cc.	Cow lactalbumin sol. 1/10 cc.	Clear. No sediment 24°.

This experiment shows that the anti-casein serum is specific for cow casein as against human casein and cow lactalbumin and agrees with the results of Hamburger and Gengou.

The specific anti-cow casein serum having been prepared, the solution of purified protein in the tough curds, obtained freshly from infants' stools and treated as in preparing casein, was then tested under the same conditions as in Experiment I. The results are given in the following table:—

EXPERIMENT II.

Nor. salt sol. 1 cc.	Nor. rabbit ser. 5/10 cc.	Cow casein sol. 2/10 cc.	Clear. No sediment 24°.
Nor. salt sol. 1 cc.	Nor. rabbit ser. 5/10 cc.	"Suspected material" 2/10 cc.	Clear. No sediment 24°.
Nor. salt sol. 1 cc.	Anti-cow casein ser. 5/10 cc.	Cow casein sol. 2/10 cc.	Cloudy 3°. Heavy sediment 24°.
Nor. salt sol. 1 cc.	Anti-cow casein ser. 5/10 cc.	"Suspected material" 2/10 cc.	Cloudy 3°. Heavy sediment 24°.

* *Journal of American Medical Association*, August, 1908, p. 752.

This table shows that casein and the "suspected material" give identical reactions with an anti-serum to cow casein, and both give no reaction with normal rabbit serum which was used as a control. It is evident, therefore, that the "suspected material" which was obtained from tough curds passed by dyspeptic infants contains cow casein.

The separate stools of two normal bottle-fed infants were dried down with alcohol and the dry residue was extracted with a weak sodium hydrate and filtered. This filtrate gave a slight fine precipitate with acetic acid. A third normal stool marked "G. F." was extracted fresh with a weak solution of sodium hydrate and filtered. This filtrate also gave a precipitate with acetic acid. All three stools were yellow, smooth, pasty, of uniform consistency and under the microscope showed nothing abnormal. The babies from whom the stools were obtained were all digesting their food perfectly and gaining in weight. Clinically, these stools were normal.

The following table shows that the normal stools treated in a manner similar to that employed in extracting the "suspected casein" gives no such reaction with an anti-serum to cow casein:—

EXPERIMENT III.

Nor. salt sol. 1 cc.	Anti-cow casein serum 5/10 cc.	"Suspected material" 1/10 cc.	Cloudy 6°. Slight sed. 24°.
Nor. salt sol. 1 cc.	Anti-cow casein serum 5/10 cc.	Cow casein sol. 1/10 cc.	Cloudy 6°. Slight sed. 24°.
Nor. salt sol. 1 cc.	Anti-cow casein serum 5/10 cc.	Human casein sol. 1/10 cc.	Clear. No sed. 24°.
Nor. salt sol. 1 cc.	Anti-cow casein serum 5/10 cc.	Sol. nor. stool (Mro) 1/10 cc.	Clear. No sed. 24°.
Nor. salt sol. 1 cc.	Anti-cow casein serum 5/10 cc.	Sol. nor. stool (OrrI) 1/10 cc.	Clear. No sed. 24°.
Nor. salt sol. 1 cc.	Anti-cow casein serum 5/10 cc.	Sol. nor. stool (G. F.) 1/10 cc.	Clear. No sed. 24°.

The writer has already demonstrated* that large tough curds in infants' stools contain a large amount of protein. A particle of the curd shows, under the microscope, varying numbers of fat drops entangled in the meshes of the protein. The greater part of this fat is in the form of neutral fat (see analyses of curds quoted above) which has not been acted upon by the digestive

* *Boston Medical and Surgical Journal*, January 11, 1908.

juices. The amount of fat in the curd depends upon the amount of fat in the milk, just as it does in artificial curds. It seems fair to assume, therefore, that the fat is entangled in the casein when it coagulates in the stomach and only so much is digested as is on or near the surface, while that in the centre of the curd is protected from the action of the digestive juices by the casein surrounding it.

CONCLUSIONS.

(1) The writer's present results agree with those of other investigators, that a specific precipitin may be obtained in rabbits for cow casein. This precipitin does not react to human casein or to cow lactalbumin.

(2) *The protein substance in tough curds in infants' stools reacts to the specific anti-cow casein serum just as does casein obtained from cow's milk. Tough curds, therefore, contain cow casein.*

(3) Three normal stools from bottle-fed babies contained no cow casein as demonstrated by the precipitin reaction.

THE EARLY STAGE OF POLIOMYELITIS.—Müller (*Münch. med. Woch.*) has studied 50 early cases of poliomyelitis. He reports numerous instances of the disease being carried by a third person. In the febrile stage there may be febrile symptoms alone, or combined with digestive or respiratory affections. Tonsillitis and bronchitis were very common initial symptoms. In many cases others in the family had tonsillitis or gastroenteritis, without paralytic symptoms. There are three cardinal symptoms for the early diagnosis of poliomyelitis, or of the disease without paralytic symptoms. The first is the inclination to perspire. The second is the frequent and pathognomonic hyperesthesia. The children cry out under the most gentle examining or the slightest movements, and they hold the arms and legs perfectly still. There is weakness of the neck. The head falls backward, but is not held rigidly. The third chief initial symptom is leukopenia, a decrease in leukocytes in spite of fever, angina, or bronchitis. Lumbar puncture showed a clear fluid under pressure, without organisms. The portal of entry is the digestive or respiratory tract, often the tonsils.—*Medical Record.*

CLEAN MILK.*

BY GEORGE W. GOLER, M.D.,

Rochester, N. Y.

In the fertile valley of the Genesee, seven miles from Lake Ontario, lies the city of Rochester, with a present population of more than 200,000. She receives daily 80,000 quarts of milk from 8,000 cows on 700 farms from a maximum distance of sixty miles in three directions.

Thirteen years ago, in 1897, when she had an estimated population of 160,000, the first systematic attempt was made under municipal control to improve the whole market milk supply by extending milk inspection into the country to the sources of supply, by increasing the number of sanitary inspections in the city, by making occasional bacteriologic examinations of the milk taken from wagons at the time of delivery, and by establishing summer milk stations in charge of trained nurses for the sale at cost of milk in nursing bottles for babies' use.

In 1900, still following the same general plan of work and pushing it forward, systematic bacteriologic examinations of the milk were begun, and a statement was issued to the producers and retailers that milk containing more than 100,000 bacteria per c.c. would be considered evidence that there was something wrong with the production and handling of the milk.

By the methods of milk work now in vogue in Rochester the Health Bureau is striving to improve the quality of all of the market milk. The milk inspector is, therefore, not only an inspector, he is a teacher, and in his teaching he strives to impress the milk producer with the elementary rules of dairy cleanliness in their simplest form, and to show these men that clean milk not only has a hygienic value in promoting the health and prolonging the lives of the consumers of their product, but that the practical application of the principles contained in these rules has, also, an economic value in prolonging the lives and usefulness of his cattle, in saving him unnecessary labor and in securing for

* Read in a symposium on "Milk" before the New York Academy of Medicine, Section on Pediatrics, May 12, 1910.

him a better market and a more equable share of the profits of the milk business.

We in Rochester have endeavored to inspect and score 800 farms from two to five times annually, to collect yearly 3,000 samples for chemical, and 1,000 samples for bacteriologic, examination, and to exercise such watchful care over the milk supply that it will become safe for children's use. To do this work we have three inspectors, no one of whom was a trained man when he came to us. Two of these men inspect and score the farms of the producers; one of them takes the farms within driving distance—ten miles from the city—and with a third man collects samples for chemical and bacteriologic examination; the third man also devotes his time to scoring the premises of the retail dealers in the city. These, with a chemist, constitute our corps of milk workers. The first man devotes his whole time to the inspection and scoring of the farms on railroad lines. The milk inspector has an illustrated booklet showing the score card and explaining in detail its provisions. He insists on four general provisions as shown in the score card—a drained barn and yard; not less than three square feet of light per cow; window ventilation from windows hinged at the bottom; the general provisions of cleanliness of stable, cow, milker, cans and utensils, and upon a milk room separate from the stable. He attempts by plan and illustration to demonstrate to the farmer that he can build and equip a milk room with cement floor, running water, a boiler, sinks, sterilizer and storing box for \$300; and he also tries to show him how he can build a model ice-house capable of holding 30 tons of ice at a cost not to exceed \$75.

This in brief is the general plan of work pursued by us. For our city the cost of this work in salaries, equipment, utensils and travelling expenses is not to exceed \$6,500 a year, including the expense of summer milk stations.

The cleanliness of the market milk may be shown by the score card and by the average bacterial count of 5,000 samples in the last five years. Forty-five per cent. of the samples collected from the wagons in course of delivery contained under 100,000 bacteria per c.c.

Of the 80,000 quarts of milk daily received into the city, 6,000 quarts are pasteurized by two companies, one company having given up pasteurizing two years ago. In a way, the effect of

clean milk on the health of a city may be gauged roughly by the number of epidemics of scarlet fever, diphtheria and typhoid traceable to milk. During the past ten years there has been one outbreak of scarlet fever, with 27 cases and 1 death; one outbreak of diphtheria, with 10 cases and 1 death, and three outbreaks of typhoid fever, with 50 cases and 5 deaths.

Starting last year we began to determine how many of our retailers were selling milk capable of producing the naked-eye lesions of tuberculosis in guinea pigs. We take milk samples in original packages, or in sterile pint bottles, from the retailer, because we believe that he should be responsible for the character of the product he sells. The work of collecting and injecting the animals is finished, but the reacting time of the animals not yet having expired we are not ready to report fully the results of the work. While it is not a perfect piece of work, and has been interrupted at various times for different reasons, we can only say now that we have tested, or have during the year secured applications for testing, more than 20 per cent. of the cattle supplying Rochester with market milk, and have had nearly 200 cattle condemned and killed. The testing has all been done by the State Department of Agriculture.

In the thirteen years from 1884 to 1897 inclusive, during which no systematic milk work was done, the total number of deaths under one year of age was 6,306; the deaths between one and five years of age 3,304, making a total of deaths from birth to five years of age of 9,610. For the thirteen year period from 1897 to 1909 inclusive, the total deaths under one year of age were 4,641, and the deaths from one to five years of age 2,080, making a total of 6,721. In the first period not all of the deaths were reported; in the last period we have reported the death of every child born at term who breathed. The mortality between birth and five years of age shows a diminution of 30 per cent. in the last period.

In our work for the improvement of the milk supply we have attempted to raise the standard of all of the market milk by the methods that have been briefly stated, for it has been our experience that it is a great deal better for the producer as well as the consumer to be taught to keep dirt out of the milk, for if it is known that milk is to be subjected to any kind of preservative process, not sufficient care will be taken to keep dirt out of it.

BOVINE TUBERCULOSIS.*

BY WILLIAM H. PARK, M.D.,
New York.

The portion of this evening's symposium on milk which has been assigned to me deals with tuberculosis in cattle and of infection of man with bacilli derived from cattle. Tuberculosis is prevalent throughout the territory which supplies milk to New York. Somewhere between 10 and 20 per cent. of all the cattle are infected. It exists to some extent in the herds on the majority of farms. Even the certified farms suffer from this infection. Here, however, it is more a matter of expense to the farmer than of danger to children, because the testing of the cows with tuberculin at least once each year allows the elimination of those which are infected before their lesions have advanced far enough to permit the entrance of an appreciable number of germs into the milk. It is to-day almost impossible for the farmer to buy a number of cows in the general market without obtaining a small percentage of infected cows. There is no time tonight to discuss fully the question of the means to eradicate tuberculosis from the herds. At present very little is done, and it is doubtful whether we can hope to obtain in the near future a milk free from tubercle bacilli. Fully 10 per cent. of the samples of raw milk taken from cans in the stores of New York City showed tubercle bacilli. As we will note later, the danger of these bacilli is limited largely to children under sixteen. I am in accord with those who, like the speaker of the evening, believe that the best plan to adopt is to have a children's milk produced under as nearly ideal conditions as possible, which will be free from tubercle bacilli and all other pathogenic bacteria, and which will contain very few bacteria of any kind. This milk should be for infants and invalids, and will also be for those who can afford to pay for the pleasure of drinking it. The remainder of the supply, which will be produced under fairly clean conditions and from cows showing no evidence of disease, will be pasteurized at a temperature of

* Abstract of address before the New York Academy of Medicine, Section on Pediatrics, May 12, 1910.

145°F. for twenty minutes or more, or at a higher temperature for a shorter time. It seems to me that it would be a mistake, on account of the cost, to attempt to have all the milk of the purity of certified milk. This heated milk will be free of all pathogenic bacteria and will contain but few bacteria of any kind. It should be kept cold during the period between being heated and consumed and should be sold within a few hours of the time of heating. There is no reason why this milk should not be produced under as good conditions as those under which raw milk is now.

The difficulty of preventing contamination of milk at the farm from typhoid carriers and undiagnosed cases of scarlet fever adds to the necessity of heating the general supply.

The Relation of Bovine to Human Infection.—The opinions of those best able to decide this question have been subject to remarkable changes during the past twenty years. At first, in spite of the results of early investigations which indicated a difference in virulence, almost all considered that the bacilli from cattle were practically identical with those from man and could equally well produce human infection. All agreed that tuberculosis in cattle should be stamped out, so as to avoid human infection. Avian tuberculosis was then sharply differentiated from human, and a little later bacilli from bovine and human sources were shown by Theobald Smith to have certain biologic differences as well as the earlier known differences in rabbit virulence. This made it necessary to test a large number of cultures from both man and cattle to determine to what degree the bovine type was transmitted to man and the human type to the cow, and if such transmission occurred how permanent were the differences in the types of bacilli. In 1901 Koch startled the medical profession with his opinion in the announcement that bovine infection of man was so rare that it was a negligible quantity in the fight against human tuberculosis.

This aroused great opposition and investigations were begun in England and Germany on a large scale. Smith in a quiet way continued his careful investigation of a number of cases. During the past sixteen months a group of us in New York City have been studying the question at the Research Laboratory. Of the workers, Dr. Krumweide, Woglom, L'Esperance and Montgomery have devoted their whole time to it. As the work of the

English and German Commissions and of Smith was devoted to selected cases and had succeeded in establishing the presence of bovine infection in some of these, we decided to take every case occurring in several hospitals devoted to children and also several hundred cases of adult pulmonary tuberculosis, so as to be able to get an opinion as to the relative frequency of infection with each type of bacilli. We have found the sparse growth of early cultures of the bovine type as contrasted with the vigorous growth of the human type on glycerin egg to be the best cultural test for differentiating the two types.

Up to the present we have completed studies on 434 cases. Of these 297 were adults, and of these but 1 case, which had a tuberculous deposit in one kidney, as the only lesion, was due to a culture of the bovine type. The 278 cases of pulmonary tuberculosis were due in every instance to the human type. Twenty-two of the 84 very young children and infants tested were infected with the bovine type, or about 24 per cent. Of 40 fatal cases there were 4 that died because of bovine infection. Of the 434 cases, 296 were over sixteen years of age; of these, but one was due to bovine infection. There were 54 cases five to sixteen years of age. Nine of these were due to bovine infection. There were 84 cases under five years; 22 of these were due to bovine infection.

Our total results indicate that about 3 per cent. of all tuberculosis existing in New York City is due to the bovine type of bacilli, and therefore caused probably by milk infection and that something over 2 per cent. of the total deaths from tuberculosis are due to bovine bacilli. In little children probably 10 per cent. of the total deaths are due to the bovine type. The percentage of tuberculous glands in young children due to bovine bacilli is fully 30 per cent. In England the amount of infection due to the bovine type seems to be somewhat greater, while in Germany it may be a little less. The combined continental figures available give a total of 491 cases, of which 436 were due to the human type and 55 to the bovine type. The age distribution was practically the same as with us. There is much more tuberculosis in young infants than is ordinarily believed. At the Babies' Hospital during the past year the majority of all cases of meningitis were tuberculous, and also a considerable percentage of cases diagnosed as bronchopneumonia and marasmus.

A CASE OF ABSCESS OF LIVER IN AN EIGHT-YEAR-OLD BOY—OPERATION, RECOVERY.

BY JAMES R. JUDD, M.D.,

Honolulu, Hawaii.

According to Holt in "Diseases of Infancy and Childhood" (1900 Edition), "in 1890 Musser found but 34 cases recorded of abscess of liver under thirteen years. Since that time a few additional cases have been reported. This suffices to show how rare the disease is in early life. In Musser's collection the proportion of recoveries was about 30 per cent." With the literature at my disposal, I have been unable to find any later report of the recorded cases of liver abscess in childhood. All authorities agree as to the rarity of the condition, and this rarity is my reason for recording this case.

The patient, a Portuguese boy eight years of age, was admitted to the Queen's Hospital, November 11, 1909. Owing to the fact that the parents spoke very little English, an accurate history was difficult to obtain. As far as could be ascertained, there had been no serious previous illness, but the boy had always been poorly nourished. For about two weeks before admission, he had complained of pain in the abdomen and would not eat much. There were no symptoms suggesting typhoid fever or dysentery.

Examination shows an anemic, poorly-nourished, undersized boy, looking very sick. Temperature 98; pulse 116 and feeble; respiration 22. Heart and lungs negative. There is no jaundice. The abdominal examination shows a tender mass in epigastrium and right hypochondrium extending three fingers' breadth below the costal margin. There is marked rigidity of the abdominal muscles and the hepatic region is very tender. Urinalysis is negative. Blood examination was not made.

Operation.—Chloroform followed by ether by drop method. Incision through the right rectus muscle disclosed an enlarged and inflamed liver extending fully three inches below the costal margin. On palpation the right lobe revealed the presence of three abscesses, each about the size of a goose egg. The remainder of the liver felt soft, with small indurated areas scattered throughout it. These were considered to be small abscess foci. The field was walled off with pads and the three larger abscesses were opened and thick, brownish pus evacuated, the amount estimated to be about two ounces. These abscesses were drained

with iodoform gauze and another piece of gauze was placed between the margin of the liver and the parietal peritoneum. The abdominal wall was then rapidly closed, allowing exit for the gauze. The operation consumed fifteen minutes, and at its completion the boy was pulseless and an absolutely bad prognosis was considered. Under vigorous stimulation the pulse was recovered at 178.

Subsequent History.—The pulse ranged from 160 to 140 during the first day following operation, and temperature from 99 to 100.6. The peritoneal protection gauze was removed in forty-eight hours. There was considerable discharge of pus from the wound. The drains were shortened on the third day and removed on the sixth day, and shorter drains replaced. The general condition of the child gradually improved.

On the ninth day there was a profuse discharge of bile from the wound. The temperature rose to 101.4 and the pulse to 148. This discharge of bile ceased in about twenty-four hours and there was no further evidence of bile until the fourteenth day, when a similar discharge occurred. The discharge of pus gradually ceased, and by the twentieth day the wound was practically healed. The boy was fed up and given an iron tonic, and two weeks after the operation was moved out of doors and in another two weeks was able to leave the hospital. At the time of discharge the wound was firmly healed, the edge of the liver could no longer be felt, there was no pain or tenderness, and the patient was gaining flesh and strength.

ADRENALIN AS AN ANTIDOTE.—While experimenting on the antagonism between various drugs, W. Falta and L. Svcovic (*Berlin. klin. Woch.*, October 25, 1909) discovered that adrenalin will counteract the toxic symptoms induced by strychnin in the frog. Similarly, if adrenalin and strychnin are injected, guinea pigs will tolerate several times the fatal dose of the latter drug. The action of adrenalin is actually antagonistic and not dependent on vascular contraction, with slower absorption, as some authors claim, since other poisons are not affected in their toxicity. The antagonism is very similar to that between atropin and muscarin. It is possible that adrenalin will also show an antidotal action toward other poisons, particularly the toxins, and that the good results reported in pneumonia, sepsis and diphtheria are due to this.—*Merck's Archives.*

SOCIETY REPORTS.

THE NEW YORK ACADEMY OF MEDICINE.—SECTION ON PEDIATRICS.

Stated Meeting, Held May 12, 1910.

DR. ELI LONG, CHAIRMAN.

This meeting was held under the auspices of the Section on Pediatrics with the co-operation of the New York Milk Committee.

THE MILK SUPPLY OF COPENHAGEN.

Professor Bernard Boggild, Royal Danish Agricultural College, Copenhagen, Denmark, told how they had solved the milk problem in Copenhagen, the capital of Denmark. This city is the commercial centre of Denmark, and has a large trade in grain, wool, butter, leather, etc. In 1890 it had a population of 312,859; with suburbs, 373,123. The milk of Copenhagen was greatly adulterated. G. Busck, a wholesale butter dealer, and to-day one of the great merchants of his nation, some thirty years ago noticed that one of his workmen showed signs of concern and abstraction, and learned that the man was worrying about his baby, being afraid that he could not raise his baby unless good milk could be obtained for him. It seemed to Dr. Busck that Copenhagen, the commercial center of the world's greatest dairy trade, should abound in good milk. He then formed the Milk Furnishing Society of Copenhagen, with a capital of about \$2,500. To-day the capital was about \$150,000. No dairies, farms or cattle were owned by the Society. This Society has been instrumental in purifying the entire milk trade of Copenhagen, and its influence has reached far beyond into the outlying countries, to Norway, Sweden and Germany as well. This Commission commenced operations in 1878; the real aim of its formation was education and sanitary protection; its official motto, "Pure Milk from Sound Cows." Forty farms, with about 5,000 cows, were under a rigid contract with this organization. The farmers bound themselves to feed their milch cattle on certain kinds of fodder, to

turn them out to pasture during the season, and to report at once any disease among the animals, the employees, or the family of anyone connected with the dairy. The Milk Furnishing Society of Copenhagen guarded itself not only from selling infected milk, but against selling milk that was even under suspicion of being infected. The dairy farms were models of cleanliness. Professor Boggild showed on the screen the well-groomed cattle, the well-kept stables, the large and small farms, the milkers, dairies, the wagons used for transportation of the milk, the milk cans, with special arrangements for keeping the milk cool, etc. The cattle were groomed before milking. No dry sweeping of the stables was permitted. The milkers, usually girls, were dressed in special costumes, and the milking force was supposed to use soap, water and towels frequently. Immediately after milking, the milk was strained, poured into sterilized receptacles, cooled and placed in a cool chamber. Usually the milk reached the consumer before it was twelve hours old. The milk was only sold in sealed glass bottles. All milk vending was under the supervision of the Board of Health. No dealer could go into the business, nor could any farmer peddle milk, without formally notifying the sanitary police. Occasional visits by the inspectors of the Board of Health and constant supervision by the sanitary police served to keep the dealers up to the prescribed standard. In 1880 out of every 1,000 deaths in Copenhagen 219 were of children under one year; in 1890 this figure had been reduced to 198, and the figure was larger than it should have been because of grippe and diphtheria. From 1902-1906 the ratio of infant mortality to total mortality was but 144 in 1,000.

PROBLEMS OF THE DAIRYMEN.

Mr. Raymond A. Pearson, New York State Commissioner of Agriculture, of Albany, N. Y., said that the dairy industry was not only important in Denmark, but in all the countries where dairies existed; they had imported not only a plan of work and methods from Denmark, but they had even in this country adopted some of their sons, who were now occupying permanent and important places in the State. With regard to the problems confronting the dairymen, he called attention to the fact that there were nearly 200,000 farms in the State of New York on which were dairy cows. There were more than 1,500,000 dairy

cows in the State. If one should ask the dairyman, "What is the chief problem confronting you?" the majority of them would reply that the chief problem was how to make ends meet. For a long time dairying had not been a highly profitable industry in this State. One might ask why men remain on the dairy farms and continue in this line of work. Many have ceased this line of work; there had also been a decreasing number of cows in some sections. But the reason more men were not giving this work up was because they had their capital invested and they could not see how they could change their occupation with their money tied up. Mr. Pearson said he did not wish his hearers to believe that dairying was not profitable on all farms; on some farms they made a good profit. At the same time, they were not receiving a fair remuneration for the work done and the capital invested. Some of the farmers to-day were even drawing on their capital. Then again there was a decrease in the fertility of the farms; this was not universal, but it did obtain in certain parts of the State. He asked why the conditions were different to-day from what they were ten years ago. The price of milk had not increased, but the cow's feed, grain and by-products had gone up in price considerably, even advancing from 50 to 75 per cent. during the last half dozen years. The price of hay had doubled in a very short time. The farmers were grappling with many problems, and they were making strong efforts to increase the yield of milk the cows were giving. The farmers were studying how to increase the strain of their cattle. In the treatment of bovine tuberculosis, the State of New York was rendering a great deal of aid. Under the present State law, a farmer believing that his cow or cows were tuberculous and who wishes to have the State veterinarian, can have one visit and examine the cow or cows free of charge; but the farmer, in return for this service, must sign an agreement that he will keep his herd free of tuberculosis. Last year the State expended \$150,000 in this work. This year a larger sum of money would be available. The farmers had learned that the tuberculosis problem was one that never would be solved until they themselves took active steps toward the solution of it.

Another problem confronting the farmer and dairyman was how he might meet the new demands along sanitary lines—the demands of the consumer, the demands of the physicians, the demands of the health officers, the demands of those who made

the laws in the interest of public health. It was interesting to note that the consumer was not up to the dairyman when it came to recognizing the real importance and value of better sanitation on dairies.

Mr. Pearson, in closing, said he would like to see in this State a movement that was comparable to the movement so widespread in the State of Maine. There it had been made a criminal offence to sell milk obtained from tuberculous cows or from cows that responded to the tuberculin tests.

CLEAN MILK.

DR. GEO. W. GOLER, health officer of Rochester, N. Y., read this paper. (See p. 445.)

BOVINE TUBERCULOSIS.

DR. WILLIAM H. PARK, Department of Health, New York City, read a paper with this title. (See p. 448.)

DIPHtheria BACILLUS CARRIERS IN PUBLIC SCHOOLS.—Slack (*Journal American Medical Association*, March 19, 1910) and his associates make the interesting and valuable observations: (1) That at least 1 per cent. of all healthy school children are carriers of morphologically typical diphtheria bacilli; (2) that such bacilli are communicable from one person to another, and the condition is usually a transient one; (3) the organisms are ordinarily of little or no virulence; (4) while it is possible that by passing through a susceptible individual their virulence might be raised to cause the disease, this is not a frequent occurrence; (5) diphtheria is kept alive in a community rather by virulent organisms in immune persons than by these non-virulent bacilli; (6) when virulent diphtheria bacilli are present, as shown by outbreaks of the disease, cultural tests of all contacts and isolation of those showing positive cultures is a duty owed to the community; (7) when the disease does not exist, isolation of carriers of probable non-virulent bacilli is of no proved benefit and is a costly and laborious procedure, entailing much unnecessary hardship on innocent and probably harmless parties; (8) the attempt to control diphtheria in a city by a round of cultures from all school children at the beginning of the school year does not seem encouraging from this series of tests; (9) the proposition to stamp diphtheria out of a city by cultural tests of all the inhabitants and isolation of all carriers is impossible from any practical standpoint.—*Boston Medical and Surgical Journal*.

THE PHILADELPHIA PEDIATRIC SOCIETY.

April 12, 1910.

CHARLES A. FIFE, M.D., PRESIDENT.

SEVERAL CASES OF BRADYCARDIA IN ONE FAMILY.

DRS. Z. M. K. FULTON (by invitation), G. W. Norris and C. F. Judson exhibited 3 cases of heart-block and bradycardia in one family, one of them an infant. All showed the influence of heredity. The father, aged forty-one, had a pulse of 50, and suffered from angina pectoris and the Stokes-Adams syndrome. The oldest daughter, aged twenty, showed a pulse rate of 60-68, was pale, easily tired and a great sufferer from headache. Her jugular tracings showed heart-block. She had never had any syncopal attacks, but was easily winded on exertion. The baby, now ten years old, had shown a slow pulse of 40-50, which was found in the first week of life. He enjoyed good health during his first year and weathered a severe attack of bronchopneumonia in his second year. Whether the cause of his bradycardia lies in an anatomical lesion in the bundle of His or is functional in nature must remain undecided.

DISCUSSION.

DR. WILLIAM PEPPER said that he felt that when this series of cases should be brought to the attention of those interested in the modern physiology of the heart, a good deal of speculation would arise, with the possible result of altering in some respects the views now held concerning the physiology of the heart. Although cases of heart-block have been reported in increasing numbers, Dr. Pepper thought this series of cases in one family unique. While it is impossible to explain this series of cases, they must be regarded as more than a mere coincidence. He imagined that Dr. Norris's last explanation might be correct, that it was some anatomical fault or peculiarity transmitted hereditarily. The tracings undoubtedly show a complete block, or complete dissociation between the auricles and ventricles. He thought that Dr. Norris had made out his case in claiming that the vagus nerve

was not at fault, but that the lesion was actually in the bundle of His itself. That such a lesion could be transmitted from father to offspring seems a little hard to believe; although, since so many other conditions are transmitted in this way, there is no sufficient reason why this very important, though very minute, portion of the human anatomy should not also be liable to hereditary disturbances. The series of cases show that heart-block may develop when there is every reason to think that no such lesion as sclerosis or gumma is present. In these cases there was probably merely a slight anatomical deviation or peculiarity transmitted to various members of the family, yet this lesion was at times sufficient to cut off the impulses that normally go through the bundle of His. At other times, the bundle was apparently able to transmit these impulses perfectly well; and at still other times, the impulses got through only imperfectly. Therefore all three conditions, complete block, incomplete block and normal rhythm, were present at different times. For this reason, it might also be argued, the condition may not be due to an anatomical lesion, but may be purely functional.

DR. FULTON said that he had found in the boy a constantly slow pulse. When at rest his pulse rate was 40; when crying or disturbed, it would not go above 50. It seldom went above 50, except a year ago, when the child had pneumonia, and even then it was not above 80. The heart always seemed to work well, and there never seemed to be any failure in circulation. The child stood the attack of pneumonia as well as a child with a normal heart would.

VERY LARGE PSOAS ABSCESS.

DR. J. T. RUGH showed a boy of eight years, with a large dorsal kyphos, who had had a large psoas abscess, extending to the left knee. His mother died of tuberculosis when he was three months old. At one year a knuckle was first noticed in his spine, but he went without treatment until three years old, when a plaster jacket was applied, which was worn only two months. No other form of appliance has since been worn. He never complained of pain, though the deformity gradually increased. At five years a lump was first noted in the left thigh below Poupart's ligament, increasing and moving progressively lower, till it reached the knee. By aspiration a quart of tuberculous pus was removed, an ounce of 10 per cent. iodoform emulsion injected

and the cavity sealed. This was repeated four and ten days later, and the opening now remains, discharging a few drops of serum daily. Two months later a half ounce of bismuth paste was twice injected, at intervals of five days, after which a firm bandage was applied, and Dr. Rugh expects closure of the opening soon. The case shows to what degree nature will sometimes care for a person. It also illustrates the tremendous size a psoas abscess may attain and how it will travel before rupturing. The spine is practically solid now and the need of a jacket or support of any kind has passed.



Showing kyphosis and
large psoas swelling.

DR. T. A. O'HARA referred to a similar case that he had just seen at the University. The abscess was not so large as that in Dr. Rugh's case. Most of it was below Poupart's ligament, this part of the abscess being half again as large as an ordinary fist; but the part above Poupart's ligament was also quite large. The boy was ten years old, and the disease was of five years' duration, and had pursued a normal course. The abscess came on quite late in the disease, in its fifth or sixth year, and was probably due to the carelessness of the caretaker of the child. The brace was in bad condition and gave imperfect support. Up to this time the patient had been doing well. The child had not been brought to the dispensary for some time. These facts

probably account for the late occurrence of the abscess.

DR. RUGH remarked that he always follows a certain line of treatment in these cases in this way: If the abscess is rapidly enlarging, pointing, or interfering with the health of the patient, he opens it. If, however, none of these conditions is present, he lets it alone, because tuberculous abscesses are not real abscesses. He aspirates such abscesses, instead of opening and draining, and his results have been much better than when he opened and drained, leaving a tuberculous sinus, which became the seat of mixed infection and caused ill health, amyloid changes in the internal organs, and the dissemination of the disease-process.

These bad features can often be obviated by simple aspiration. In other cases, like that mentioned by Dr. O'Hara, in which brace-treatment is being followed, an increase of the support and fixation will often do away with the psoas abscess. Dr. Rugh had seen cases in which the abscess had appeared and disappeared three different times, and finally remained away under efficient support.

GENERAL STREPTOCOCCIC INFECTION, WITH SYMPTOMS
OF EMPYEMA.

DR. ELEANOR C. JONES reported the case of a boy of two and one-half years of age, with a most unusual temperature range. The chart shows a daily variation of from 5° to 8° F. Illness began as acute purulent otitis media; pneumococci were found in abundance in discharge from the ear and in smears from the throat. In a few days dullness developed at base of the right lung posteriorly, above which fine râles and bronchial breathing were heard, while breathing was rapid and labored. A diagnosis of encysted empyema was made, with a surrounding area of pneumonia. Repeated punctures failed to locate pus. The leukocyte count was 28,000, with 81 per cent. of polynuclear neutrophiles. Streptococci and pneumococci were found in the aural discharge and bronchial mucus. Streptococci were also found in the blood. An X-ray showed a deep shadow over the right base posteriorly. The child recovered and now shows a normal chest.

DR. J. P. CROZER GRIFFITH said that he did not know what was the matter with the child at the time he saw it, and did not think he knew yet. All physicians are accustomed to see irregular temperatures in children, running for quite a long period, due to causes not discoverable; but they do not present a chart like this, the most remarkable that he had ever seen. He still felt, as he had felt when he saw the child, that the case was one of empyema, though small, and maybe a plastic pleurisy, which the history rather indicated. From other experience, Dr. Griffith was convinced that when symptoms of empyema are present one may do a good many punctures without getting any pus, until one happens to strike a single small spot. He remembered a case in which a puncture was made and a very small amount of pus obtained. The case was then turned over to the surgeons, who put in a large needle and found nothing. He concluded that a small pleuritic effusion is capable of causing a good deal of constitutional dis-

turbance. He thought that in this case there was probably a septic infection coming from a very small area, the consolidation not depending on the fluid and not being of a fluid nature. Dr. Griffith had seen the child on two occasions and had heard about it many times. It maintained a remarkable degree of resisting power, never seeming to be in the profoundly septic state that one would expect with such a temperature.

DR. ALFRED HAND, JR., said that the remark made some years ago still holds good: that we do not know all about infections. He thought he had understood Dr. Jones to say that streptococci had been found in the blood. He had been unfortunate in not being able to find them in similar cases. He had had cultures made, but had not discovered the germs causing the disease. In a similar case recently seen he punctured the right base with negative results, which he explained on the ground of the physical sign met with so often in children, a lack of expansion of the right base of the lung, probably due to the presence of the liver in that neighborhood. Children breathe more with the left than with the right lung. The origin of these cases is often a mystery. Sometimes there will be a focal symptom that will explain the origin—suppuration connected with some of the air sinuses of the head. In one case he never found a focus. The child would have a normal temperature most of the day, and at nine o'clock in the evening it would rise to about 103°F. , coming down about 12 or 3 A.M. The case went on for twelve weeks, when the child suddenly developed convulsions and died; and the autopsy did not explain the cause of death. Dr. Hand thought that this case was about as much of a mystery as Dr. Jones's.

DR. RUGH said that this case recalled one of which he had had charge for over a year. Anyone who meets with a case of infection in sinuses or other portions of the body in which metastatic conditions develop, will realize one thing very forcibly, that is, the extreme virulency of the ordinary staphylococcus. Dr. Rugh's case had been seen by Dr. Hand over a year ago. It was first treated as typhoid, and Dr. Rugh was not sure that it was not typhoid, the history of acute osteomyelitis being mistaken for typhoid fever being so common. The child had osteomyelitis of the femur on one side. After a few months he developed pulmonary symptoms, and Dr. Hand, who saw him then, said that he had pleurisy with effusion. Dr. Rugh saw the patient some

months later, and recognized the extensive osteomyelitis and the empyema. He tapped, and found a large quantity of pus, which contained staphylococcus. Several operations were done, and this finally healed.

Then the patient developed an abscess at the head of the left humerus, which was opened, and small pieces of bone were discharged. He next developed a spot back of the left ankle and pus was discharged from this. Dr. Rugh opened an abscess at the lower end of the left radius yesterday; and some weeks ago, one at the posterior axillary fold, out of which small pieces of bone were discharged. Eight or ten inches of dead bone from the right femur have also been removed, and the boy is now recovering. Dr. Rugh concluded that one never knows when a case of staphylococcus infection is healed, or how widespread may be the metastasis.

DR. D. J. MILTON MILLER said that other conditions will give a temperature chart like that exhibited by Dr. Jones, and referred to a case of septic endocarditis which had a similar temperature chart. In regard to puncture of the chest and the inability to find pus when the physical signs indicate its presence, Dr. Miller said that he had seen a case with Dr. Harry Deaver, that of a young girl who had developed chest symptoms after appendicitis. Dr. Deaver punctured the chest fifteen times, and the last time got pus.

DR. JONES commented on the paucity of references in the text-books to these irregular temperatures in children, none of them containing any real comment concerning the condition. It is so common to find children running temperatures that one cannot account for, and getting well without their having been accounted for, that the authors of text-books are not doing their full duty when they neglect to tell their readers something more about this subject.

DR. MILLER added that one cause of such temperatures is just coming into notice now, viz.: genito-urinary infection. He had seen a child over and over again since last fall, and had only recently discovered that the trouble was in the genito-urinary tract. For financial reasons, he did not see this child very often during the winter. Its temperature would rise for a day or two, and then it would apparently get well, and then the same thing would happen again. This has been going on since last January. A few

days ago, Dr. Miller examined a specimen of the urine, and found that the trouble was pyelitis. It is getting well now under the use of urotropin.

MITRAL DISEASE AND ADHERENT PERICARDIUM.

DR. A. E. SIMONIS (by invitation) exhibited the heart of a six-year-old girl, whose mother had died of cardiac disease. She had had frequent attacks of follicular tonsillitis. Autopsy showed adherent pericardium and a large vegetation, cylindrical in shape, half filling the left auricle and ventricle, attached to the papillary muscle in the ventricle.

PERSONAL OBSERVATIONS ON THE TREATMENT OF ILEOCOLITIS.

DR. D. J. MILTON MILLER said that the difficulty of classifying infantile diarrheas from symptomatology alone was recognized. Yet there is a well-defined form of summer diarrhea, usually denominated ileocolitis, as the lesions have their seat in the ileum or colon or both. The treatment comprises: First, efficient purgation with castor oil or magnesium sulphate. Calomel, because of its irritant properties, should never be used. No opium or bismuth must be given during this period. Second, absolute abstention from all food except water for twenty-four hours. Third, cereal gruels, 2 ounces only, every four hours, alternating with a mild stimulant food, such as panopeptone or weak sherry and water. This may be flavored with 1 dram of beef juice, alone or in 2 ounces of water. Small amounts of food are less apt to provoke peristalsis than are larger ones. After three or four days whey is added in half ounce quantities daily, until one-half of the mixture is whey. Then whole skimmed milk, 1 dram daily, is added, until a half ounce is given; then a half ounce every second, third or fourth day. If this disagrees, condensed, malted or buttermilk is tried, or peptonized milk. The early resumption of whey and milk is carried out as long as the temperature is not over 103°F., whether stools are numerous or not, provided these two features are not materially affected by the addition. The early use of milk maintains nutrition and recovery is hastened; fat is not well borne, hence whole milk is preferable to cream. As relapses are easily provoked, especially in older infants, great care with diet is necessary for a long time.

The most valuable drug is castor oil, lessening tenesmus and mucus, and curtailing the attack. Epsom salts may be substituted.

Bismuth is only of value when it blackens the stools. Opium is only necessary when pain is excessive, while morphin is valuable hypodermically when symptoms assume a choleraic type. Cocain suppositories are of use for tenesmus. Dr. Miller only employs irrigations when there are five to eight mucous stools daily, never when stools are numerous or with much tenesmus. Irrigations with argentic nitrate are of value in prolonged cases, with much mucus. Fresh air, warm daily baths, warm abdominal applications are valuable adjuncts to the treatment. Special symptoms are to be treated according to accepted methods.

DR. HAND said that many doctors failed to stop milk absolutely, although they thought they had done so. They have, however, kept on with whey or some milk food which furnished culture-medium for the germs. Dr. Hand agreed with Dr. Miller that castor oil was probably the best purgative in these cases, although he had been using magnesium sulphate with as good if not a better result. The investigations of Abt, of Chicago, show the value of the latter.

DR. RUGH remarked that his father, an old country doctor, who has been practising for fifty-nine years, has been very successful in treating this class of cases. His favorite method of treatment is to give sulphate of soda (Glauber's salts, 5 grains to the dose, in solution) with a little sulphuric acid for a number of days. He is not a specialist, but he has obtained excellent results in the treatment of the summer diarrheas and ileocolitis of children. He follows this method of treatment until he notices certain changes in the discharges, and then uses a preparation of thymol.

DR. W. N. BRADLEY said that he had had 2 or 3 cases in which he had given bismuth in large doses, and found that it came through unchanged. He considered this to be probably due to the absence of certain gases in the digestive tract. At first, he was sure that the child was passing curds of milk. As he had stopped the milk, he examined the mass and found it to be unchanged bismuth. In such cases, the bismuth, of course, had done no good.

DR. JONES stated that she gives castor oil in such cases, and that her indication for a repetition of the dose is the foul odor of the stools. She gives very little bismuth. With the use of castor oil and careful feeding, stopping all milk and usually giving cereals, she finds that she can get her cases well more easily than by the old method of giving astringents. As the cases approach

convalescence, she tries to secure a little mother's milk. The children in such cases are, of course, usually bottle-fed; but if they can get an ounce or two of mother's milk a day, this will help toward a speedy convalescence. In the early stages, Dr. Jones employs copious irrigation with camomile tea, which she considers to be even a better irrigant than salines. She repeats this procedure during the first days of the illness, and stops it after she feels that the residual matter is all washed out.

DR. HARRY LOWENBURG said that he had employed the Murphy treatment in 2 cases last summer. They suffered from marked toxemia, as evidenced by extreme nervousness, irritability, delirium in an older child and suppression of urine. Both cases were markedly benefited, and in one the procedure seemed to be life-saving. He asked Dr. Miller whether he had had any experience with this treatment in these cases. Dr. Lowenburg was surprised to hear Dr. Miller recommend the use of pasteurized milk and wished to know why he preferred to use pasteurized milk when the best certified milk was obtainable.

DR. MILLER answered that Dr. Jones's suggestion in regard to mother's milk was excellent, but that the trouble was that this can rarely be obtained. In regard to the resemblance between unchanged bismuth and milk-curd, referred to by Dr. Bradley, Dr. Miller said that he was glad that this had been mentioned, and that he would insert this in his paper before sending it to the printer. He had known of this resemblance for a long time, and used to be deceived by it. Often he had been at a loss to know where the child had got the milk to produce curds, as he had told the parents to stop the milk. He has even accused them of not straining the whey properly.

In some of these cases, one may give bismuth for many weeks, without its having the slightest effect upon the stools. As soon as the stools get black, the bismuth acts as an astringent; but Dr. Miller considered the reason of this to be that the bowels are regaining their natural condition. Dr. Miller said that he never uses the colonic Murphy treatment in these cases. He had, however, seen recently a case of pneumonia with extreme tympany, so great that it was killing the baby. All methods were without result until the Murphy treatment was employed by the physician in attendance. Irrigations of this were given for two hours, and the tympany subsided entirely, the abdomen collapsing completely.

The only reason that Dr. Miller had advised pasteurized milk was that he thought it should be employed merely as an extra precaution. He was inclined to think that summer diarrheas have increased somewhat because of the fact that no one uses pasteurized milk any more. His experience for many years has, of course, been largely at the seashore, his patients being, therefore, under the most favorable conditions. They do, however, acquire very severe types of this disease. He mentioned having seen recently in consultation a most severe case of ileocolitis of five weeks' duration, in which the child of two years was still having twelve to fourteen putrid stools a day, with extreme emaciation. This case developed at the seashore; hence Dr. Miller was inclined to use pasteurized milk as an additional safeguard.

NEPHRITIS FOLLOWING VARICELLA.

DR. E. J. G. BEARDSLEY (by invitation) reported 2 cases of nephritis occurring during and after attacks of chicken-pox. One was in an Italian girl of six years, the other in a negro boy aged five years. Albumin and casts were found in both cases in the urine.

DR. BRADLEY said that Dr. Beardsley's reference to the lesions of chicken-pox becoming hemorrhagic recalled to his mind a case seen at the Children's Hospital two weeks ago, in which all the lesions were hemorrhagic. The child was intensely ill and died on the fourth day. This case was seen by several physicians, who all agreed that it was varicella.

THE CASEIN CONTENT OF WOMAN'S MILK.—Engel and Frehn (*Berlin. klin. Woch.*, March 7, 1910) have analyzed a considerable number of specimens of woman's milk in respect to the casein content. The specimens varied from the eleventh to the two hundred and twenty-third day of lactation. Their conclusions are that the casein nitrogen makes up from 40 to 45 per cent. of the total nitrogen. The casein content of the milk varies from 0.4 to 0.6 per cent. The relative amount of casein in the milk varies greatly in the same person, for which no laws can be laid down. The various factors which influence the composition of woman's milk, as period of lactation, individuality, phase of nursing, and intermission between nursings, appear to play no especial rôle in the determination of the casein content.—*Medical Record*.

CURRENT LITERATURE.

ABSTRACTS IN THIS NUMBER BY

DR. S. FELDSTEIN.

DR. C. D. MARTINETTI.

DR. R. S. HAYNES.

DR. M. C. PEASE, JR.

DR. ALFRED F. HESS.

DR. FRITZ B. TALBOT.

DR. S. W. THURBER.

DISEASES OF THE EAR, NOSE AND THROAT.

BRAISLIN, WILLIAM C.: A NOTE ON EUSTACHIAN OBSTRUCTION. (*Annals of Otology, Rhinology and Laryngology*, March, 1910, p. 71.)

The presence of purely tubal symptoms in all kinds of ear diseases will help to differentiate between obstruction of the tube and inflammation of the tympanic cavity proper. The snapping sound in the ears on swallowing or blowing the nose means always partial tubal obstruction. It is never present in normally open tubes. Another common symptom is the sensation of fullness and a sound sensation as if talking in a barrel. Pain is not usual. Tinnitus may or may not be present.

The author believes the absence of snapping sounds indicates a patent tube or one so obstructed that no air passes at all.

S. W. THURBER.

BRAISLIN, WILLIAM C.: A STUDY OF SOME CASES OF THE INFANTILE PHARYNX WITH SPECIAL REFERENCE TO THE EUSTACHIAN TUBES. (*Annals of Otology, Rhinology and Laryngology*, March, 1910, p. 36.)

The relative size and shape of the infantile pharyngeal cavity as compared with that of the adult, is the basis of the following article. In the infant, the long axis is horizontal rather than vertical; also the long diameters correspond to the axis in each case. The vault of the infantile pharynx is nearly rectangular and the mucous membrane here covers a pad of lymphoid tissue arranged in folds. Back of this pad of glandular tissue the surface is smooth. These folds are seen as the lobules in the adenoid hypertrophies so frequently noticed on their removal.

On the lateral walls the Eustachian prominences are relatively much larger in the infant than in the adult and the cartilages are crowded close to the roof. The mouths of the Eustachian tubes are more on a level with the nasal floor in the infant. It would seem that the function of moistening and warming the inspired air is greatly performed in the infantile pharynx rather than entirely in the nasal cavities, as in the adult structures. This may be one reason why there is greater lymphoid hypertrophy in the child as compared to the adult.

On account of the shape of the infantile pharynx, the author believes the curet the instrument of choice in removing hypertrophies in children under five years old.

S. W. THURBER.

GRUENING, EMIL: SINUS THROMBOSIS OF OTITIC ORIGIN AND ITS RELATION TO STREPTOCOCCEMIA. (*Annals of Otology, Rhinology and Laryngology*, March, 1910, p. 147.)

In the last 10 cases of thrombosis of the lateral sinus occurring in the otologic service of the Mt. Sinai Hospital, the blood cultures showed streptococcus in seven. Of the 10 cases, 8 recovered and two died. The blood taken from the veins of the arm will demonstrate the microorganism better than if taken from the sinus. The presence of streptococcus in the blood does not necessarily mean a fatal issue, but, on the contrary, provided the jugular vein is ligated, permits of a favorable prognosis.

One of the cases cited was that of a boy of ten, who had been complaining of a severe pain in the left ear, with headache, fever, prostration, for twelve days. He had also had projectile vomiting for the last five days. White blood cells 11,000 and polynuclear count 86 per cent. Both drums were incised and pus found in both tympanic cavities, containing the streptococcus pyogenes. The next day the left mastoid was operated upon and sinus infection found. Three days afterward, showing no improvement, the right mastoid was opened, but the sinus here appeared normal, though the mastoid cells were full of pus. Subsequently he developed abscesses in the right thigh, the occipital region, the right knee joint, posterior surface of both arms, and perineal region. The boy was discharged at the end of two months, with all his wounds healed, with good hearing and a movable knee joint.

S. W. THURBER.

BACTERIOLOGY.

APERLO, G.: RESEARCHES ON PROPERTIES OF PSEUDODIPH-
THERITIC BACILLI. (*R. Accademia Fisiocratici*, November, 1908.)

Aperlo carefully studied 25 types of pseudodiphtheritic bacilli, comparing them with a diphtheritic one. He found that while the varieties present some characters common to all, a systematic examination of their properties, morphological, cultural and biological, suffices to differentiate the bacilli. None of the pseudodiphtheritic varieties considered gave any result inoculated in caviæ. The deviation was equal in serum treated with pseudodiphtheritic bacilli, and in that treated with true diphtheritic, consequently this would be of no help in differential diagnosis.

C. D. MARTINETTI.

PHYSIOLOGY.

TALBOT, FRITZ B.: A METABOLISM EXPERIMENT ON AN INFANT AFTER GASTROENTEROSTOMY FOR CONGENITAL PYLORIC STENOSIS. (*Boston Medical and Surgical Journal*, April 14, 1910, p. 491.)

This is an estimation of the fat and protein ingested and excreted during three days by a child of five and one-half months, upon whom three and a half months previously a gastroenterostomy had been done. The conditions could be absolutely controlled, so that the results were accurate. The infant utilized 97.2 per cent. of the fat ingested, and 98.1 per cent. of the proteid, showing that his digestion was not affected by the operation.

R. S. HAYNES.

KNAPP, CLINTON B.: THE HOUR OF BIRTH. (*Bulletin of the Lying-in Hospital of the City of New York*, September, 1909.)

This is a careful analysis of 39,000 cases of normal labor occurring in the outdoor obstetric service of the New York Lying-in Hospital, with a view to ascertaining the hour of the day at which the greatest number of births occur. The series show an overwhelming preponderance of births in the twelve hours from 10 P.M. to 10 A.M. Dividing the day into eight hour periods, the

maximum comes between 10 P.M. and 6 A.M.; into six hour periods, between 9 P.M. and 3 A.M.; into four hour periods, between 10 P.M. and 2 A.M.; into three hour periods, from 9 to 12 P.M.; into two hour periods, from 10 to 12 P.M.; into single hour periods, between 11 and 12 P.M. So the old contention that births take place oftenest at night is borne out. Knapp thinks that this is due to the activities of the day starting up labor and resulting in a birth approximately twelve hours afterward.

R. S. HAYNES.

MEDICINE.

KRAUSE, P., AND MEINICKE, E.: THE ETIOLOGY OF ACUTE EPIDEMIC POLIOMYELITIS. (*Deutsch. med. Woch.*, April 7, 1910, p. 647.)

Krause and his co-worker still contend that the above disease may be reproduced in rabbits if large enough injections and the proper technic are resorted to. The chief conclusions of this article are that the virus is present not only in the tissues of the central nervous system, but also in the cerebrospinal fluid, the blood, and the parenchymatous organs of the afflicted individual. It is present during life in the body fluids, and if these fluids are injected into rabbits the disease may be transferred to these animals. They believe that this diagnostic aid gives us a means of detecting atypical cases, for example, those resembling an encephalitis, and that it will also be the means of uncovering suspicious abortive cases.

ALFRED F. HESS.

ENGEL, S.: GASTRIC DIGESTION IN INFANCY. (*Münch. med. Woch.*, No. 12, 1910.)

Whereas breast milk is digested, for the most part, in the intestine and to a less extent in the stomach, the reverse is true in the case of the digestion of cow's milk. As the result of this physiologic fact we find the gastric juice of infants who are artificially fed less potent than that of breast-fed infants. Furthermore, Engel states that mother's milk, in spite of its high fat content, leaves the stomach far more rapidly than does cow's milk.

ALFRED F. HESS.

FRANKL-HOCHWART, L.: THE DIAGNOSIS OF TUMORS OF THE PINEAL GLAND. (*Deutsch. Zeits. f. Nervenheilk.*, Vol. XXXVII., Nos. 5 and 6.)

The author describes a most interesting case where a teratoma of the pineal gland was found at autopsy; this is the fifth recorded case. The patient was a five and one-half-year-old boy. His father and two uncles had cleft palate and two other children had congenital anomalies. From the third year the boy developed precociously, both mentally and physically, being especially tall. Five months previous to death pressure symptoms developed, such as strabismus, choked disc and headache. Four weeks before the exitus there was marked growth of the penis, erections and growth of the pubic hair. The characteristic symptoms, according to the author, are abnormal growth in length, premature genital and sexual development, tendency to obesity, and mental precocity. These phenomena associated with symptoms of a tumor causing ataxia and paralysis of the eye muscles should make one suspect the lesion.

ALFRED F. HESS.

HUBBARD, THOMAS: HEMOPHILIA, WITH REMARKS ON THE HEMORRHAGIC DIATHESIS. CASE REPORTS. (*Annals of Otolology, Rhinology and Laryngology*, March, 1910, p. 25.)

CASE I. A healthy boy of four, double tonsillectomy with blunt dissection and snare and adenectomy with forceps and curet, performed in December, 1908. Profuse bleeding, which had apparently ceased while the child slept for about five hours. He then vomited a very large quantity of dark clotted blood. The seat of bleeding was located in the left tonsillar fossa and digital compression used. Bleeding ceased for fourteen hours, when it was again detected and compression forceps applied for seven hours. Normal saline, 4 ounces, was given per rectum every two hours, and 90 grains of lactate of calcium, by same route, were given daily. Temperature elevated one or two degrees and pulse always above 130. During the fifth day there was violent bleeding from the right tonsil, which was controlled by compression forceps. After this it was found that local pressure in both tonsillar fossæ and in the nasopharynx with swabs of gauze soaked in Monsel's solution every six hours (thus anticipating the periods of bleeding) controlled the bleeding.

The family history of this case revealed the facts that the father had had a severe nose bleed of several days when he was about five years old; his maternal grandfather had a prolonged hemorrhage from a tooth socket and died of pulmonary hemorrhage.

CASE II. Girl of ten years. Nose bleed for three days, which several physicians had been unable to check. She was extremely exsanguinated and fainted during the examination; partial inversion and hot saline enemata restored her to consciousness. Examination of the nose showed a general oozing from the anterior third of the septum and from the inferior turbinate bodies. Firm packing with gauze finally controlled the bleeding. When this was removed she still bled at intervals for two weeks, and on examining her mouth, the gums, tongue and mucous membrane of the cheeks showed signs of scorbutus. A diet of fruit juices, fresh vegetables and beef and milk soon restored her to good health.

The author states that the hemorrhagic diathesis may be divided into two classes—the pathologic and the nonpathologic. To the former belong those diseases characterized by unaccountable hemorrhages into the skin, mucous membranes, joints, organs; with or without inflammatory conditions, such as scurvy, purpura hemorrhagica, etc. The condition known as hemophilia alone represents the nonpathologic class. It is a permanent condition and is intensely hereditary. Women from bleeder stock, but not bleeders, are called conductors. The proportion of males to females is 13 to 1. Males are rarely conductors. More than 50 per cent. of cases occur as nose bleeds.

A proper direction of inquiry for the surgeon should be under the following heads:—

(1) Daughters of a bleeder father are exempt, but may transmit to male offspring.

(2) Sons of bleeder father are, as a rule, exempt and do not transmit to offspring.

(3) The daughter of a bleeder father may transmit to one, several, or all her offspring.

(4) Where there are several daughters only one or all may transmit to offspring.

(5) Occasionally there is direct transmission from father to son through several generations.

(6) The disease does not appear in the issue of the sons of a bleeder family who are not themselves bleeders.

(7) There is not always evidence of hereditary influence. Purpura hemorrhagica and scorbutus should always be considered in making a diagnosis of hemophilia.

Two or three per cent. of the body weight may be lost by hemorrhage without materially altering blood pressure; thus in a child of 30 pounds nearly a pint of blood may be lost without altering pressure, but the vital centers would not stand a prolonged degree of anemia without permanent damage.

The author also discusses the various drugs used and the injection of sera and finally transfusion. S. W. THURBER.

MARRE, FRANCIS: ALBUMIN IN THE URINE OF NURSINGS. (*Revue d'Hygiene et de Medicine Infantiles*, 1910, No. 2, p. 117.)

Marre concludes that albumin in the urine of newly born babies and nurslings indicates to some extent a pathologic condition. Maternal heredity (renal insufficiency during pregnancy) explains habitual congenital albuminuria, a symptom of weak kidneys, which is more or less grave. The infant may acquire albuminuria secondary to a general infection which is identical with that of the adult. FRITZ B. TALBOT.

HEIMAN, HENRY: THE SYMPTOMATOLOGY, COMPLICATIONS AND PROGNOSIS OF PNEUMONIA IN CHILDREN. (*American Medicine*, April, 1910, p. 174.)

Dr. Heiman places some emphasis upon the difficulty of making an early diagnosis of pneumonia in children. The dyspnea and cough so noticeable in the adult are commonly absent in children; and, furthermore, the physical signs are frequently delayed. The time when signs become demonstrable depends chiefly on the original site of the lesion, whether peripheral or central. In peripheral pneumonia changes occur in the chest within twenty-four to thirty-six hours from the onset; whereas, in a centrally located pneumonia, signs of consolidation may not make their appearance before three to five days, or even longer.

In bronchopneumonia there is usually a preceding bronchitis, following which the temperature rises, the respirations increase in number, and the pulse becomes rapid. Here and there over the chest are a few fine râles. The physical signs may ultimately

closely duplicate those of lobar pneumonia, or, going to the opposite extreme, the only signs present in the chest may be those of a diffuse bronchitis.

As Dr. Heiman points out, these two diseases, lobar pneumonia and bronchopneumonia, are distinct affections; and he closes his paper with the hope that future bacteriologic studies will enable us to place their classification on a firmer basis than is possible at present.

M. C. PEASE, JR.

PAROUZINI, G.: ON THE SYPHILITIC ORIGIN OF WERLHOFF'S DISEASE. (*Gazz. degli. Osped.*, No. 19, 1909.)

A child of nine years, with no temperature nor gastric disturbances, began to feel soreness of the limbs and three days later presented crimson spots all over the body. This occurred every two weeks for several times together with intestinal hemorrhages. The child had previously been treated for syphilitic ulcerations of the mouth contracted while nursing as a baby. Nielsen and Murri had similar cases, which would seem to indicate a syphilitic origin of Werlhoff's disease.

C. D. MARTINETTI.

FERREIRA, C.: CONTINUAL CRYING IN INFANTS OFTEN A SIGN OF HEREDITARY SYPHILIS. (*O Brasil Medico*, September 15, 1909.)

Ferreira describes a case similar to others recorded by Sisto, Comby, Ganig and Marino, who conclude that incessant crying in infants often is caused by hereditary syphilis, especially when otitis and indigestion are excluded. The pain caused by syphilitic osteochondritis is aroused by pressure or movements. In one case Parrot's pseudoparalysis appeared. Specific treatment gave good results.

C. D. MARTINETTI.

FERREIRA, C.: INCESSANT CRYING A SYMPTOM OF HEREDITARY SYPHILIS. (*Archiv. Méd. des Enfants*, No. 5, 1909.)

Ferreira had a case of a child three months old who incessantly cried from its birth. At one month the articulations of both elbows and hands presented large swellings. There were coryza and purulent conjunctivitis; frequent diarrhea and vomiting. A few days of mercurial treatment sufficed to reduce the child to a normal state. It died later of acute bronchitis.

C. D. MARTINETTI.

HYGIENE.

MEYER, L. F.: THE IMPORTANCE OF MINERAL SALTS IN THE DISTURBANCES OF NUTRITION OF THE INFANT. (*Jahrb. für Kinderhk.*, January 4, 1910, p. 1.)

The important differences between human and cow's milk are attributable to differences in the two wheys, as shown by experiments of the author, in which infants thrived on a combination of cow-curd and human-whey, whereas they did not gain on human-curd and cow-whey.

The kation Na, when taken in the body, produces water retention, the most marked action being that of Na Cl. K and Ca either produce no change in weight or loss of weight.

Ingestion of 2 to 3 gms. of Na Cl almost invariably produces a rise in temperature, which reaches its height in four to six hours. The influence of K on the temperature is less regular and not infrequently entirely absent. Ca reduces the body temperature.

In the normal infant addition of fat to the diet produces diminished absorption of salts from the intestines, yet there is no greater excretion, so that the balance is not disturbed.

In the sick infant, before he has reached the stage of decomposition (Finkelstein's classification), the addition of fat to the diet leads to increased excretion of magnesium and calcium in the stools. In the stages of decomposition and intoxication, ingestion of fat increases the excretion of alkalies in the stools.

In the loss of these salts from the body may perhaps be found the explanation for the clinical symptoms observed during the various stages of disturbances of nutrition of the infant.

S. FELDSTEIN.

SCHLOSS, E.: INFLUENCE OF SALTS ON INFANT METABOLISM (*Jahrb. für Kinderhk.*, March 1, 1910, p. 296.)

A certain minimum of salts is necessary for growth; the ingestion of more than this amount has no marked influence on nitrogen metabolism, unless the quantity is so great that the cells are directly injured by them or other important constituents are withdrawn from the cells.

It was found by the author that all the salts studied were absorbed equally rapidly. The rate of excretion, however, varied considerably. The excretion of sodium chlorid begins slowly

and continues for some time. Potassium chlorid is rapidly excreted, while the rate of excretion of calcium chlorid lies between the two. The ingestion of 0.5 to 0.75 gms. of sodium chlorid produced an increase in weight of 60 to 120 gms. Sodium bromid also produced increase in weight, but a larger quantity of the salt was required to produce an equal gain in weight. Sodium iodid required still larger doses.

Ingestion of potassium chlorid produced first loss then gain in weight.

Calcium salts in larger doses brought about loss of weight.

It is thus seen that all the three metals exert a positive influence on the water metabolism of the infant.

Sodium salts have the most marked and prolonged effect, while the influence of calcium salts is only transitory in nature.

In the author's opinion the difference in action is due to the degree of toxicity of these salts for the body and the kidneys and the rapidity of their excretion. Sodium chlorid, being the least toxic, is retained the longest. Potassium chlorid is more toxic, and is, therefore, excreted more rapidly. Calcium chlorid requires considerable dilution in order that it may be excreted by the kidneys; it consequently withdraws more water from the tissues.

The influence of these salts on the body temperature is explained by the author on the theory that rapid chemical union of salts and water in the body leads to fever, while rapid excretion of salts and water produces subnormal temperature.

S. FELDSTEIN.

BAKER, S. JOSEPHINE: THE DIVISION OF CHILD HYGIENE OF THE DEPARTMENT OF HEALTH OF NEW YORK CITY. (*The Woman's Medical Journal*, April, 1910, p. 74.)

In the spring of 1908 the Bureau of Municipal Research of the Department of Health of New York City conducted a series of investigations to determine the feasibility of placing under one administrative head all of the functions of the department which related to the welfare of children. Dr. Baker, who has been placed in charge of the division, considers that it is the most comprehensive organization for the promotion of the health of children that has ever been put into operation; and quotes the Commissioner of Health to the effect that the division is "poten-

tially one of the most important steps in the history of preventive medicine." The activities of the division include:—

- (1) The control and supervision of midwives.
- (2) Instruction of mothers in the care of babies.
- (3) Supervision of foundling babies boarded out in homes.
- (4) Inspection and sanitary supervision of day nurseries.
- (5) Inspection of institutions harboring dependent children.
- (6) Medical inspection and examination of school children.
- (7) Enforcement of that part of the child labor law which relates to the issuing of employment certificates.

M. C. PEASE, JR.

THERAPEUTICS.

FEDINSKI, L. J.: THE EFFECT OF MOSER'S SERUM ON THE COURSE AND MORTALITY OF SCARLET FEVER. (*Jahrb. für Kinderh.*, January-February, 1910.)

This detailed report is based on 317 cases of scarlet fever treated during 1906, 1907 and the first half of 1908 at the St. Vladimir Children's Hospital at Moscow; 80 of these cases were observed personally by the author.

The serum employed was prepared at the Bacteriological Institute of the University of Moscow, and was administered in most of the cases in doses of 200 c.c.

The results in the 317 injected cases are compared with those in 910 cases not injected with serum. All the cases were otherwise treated alike—rest in bed and milk diet for twenty-one days.

For the purpose of comparison the cases are divided into 4 groups, following the classification of Moser. The groups are: (1) Mild, (2) moderately severe, (3) very severe, (4) lethal.

In the fourth group there were 42 cases, with a mortality of 35.5 per cent., whereas previously in the same hospital in 1900-1903 there were treated 71 cases (without serum), with a mortality of 100 per cent.

In the third group, the very severe cases, 58 cases were treated with serum with a mortality of 21.4 per cent., in contrast to 148 cases without serum, in which the mortality was 70 per cent.

There were 123 cases in the second group (moderately severe), with a mortality of only 2.7 per cent., while in 1900 to 1903 there were 222, with a mortality of 23.9 per cent.

Attention is called to the striking fact that the mortality is lower the earlier the serum is injected. Death in the fatal cases occurred later in the injected than in the non-injected cases.

In 60 per cent. the temperature fell to normal or to 38°C. within twenty-four hours. This effect may be permanent or it may last only twenty-four hours. The earlier the injection the more marked is the effect on the temperature. In the injected cases the average duration of the fever was four to five days, while in the non-injected cases it was ten to fifteen days. The serum exerts a favorable action on the heart and general condition, the cardiac outlines become smaller, the pulse slower, the appetite returns, prostration diminishes, and consciousness returns. This effect is especially marked in the hypertoxic cases.

When the serum is injected on the first or second day of the disease the rash remains rudimentary, does not spread and disappears rapidly. Severe ulceration of the throat occurred less often in the cases treated with serum.

The large doses at present required and the difficulty of preparing the serum are, in the opinion of the author, the only disadvantages of this mode of treatment. S. FELDSTEIN.

INFANT FEEDING.

LASSABLIÈRE, P.: PHYSIOLOGICAL VARIATIONS IN THE COMPOSITION OF MILK. (*Annal. de Med. et Chir. Infant.*, 1910, No. 7.)

I. Human milk.

Fat varies the most of all the elements in human milk and shows considerable differences in per cent. Lactose is the most constant component in human milk, the average percentage being 7.5. As lactation progresses the percentages of salts very gradually decrease.

II. Cow's milk.

Fat varies from 2.5 to 5.5 per cent. Lactose 4 to 5.25 per cent. Protein 3.4 to 5 per cent., and mineral matter 0.6 to 0.75 per cent. The ash is remarkably constant.

III. Horse.

Average fat, 5.8 per cent.; sugar, 4.6 per cent.; casein, 4.2 per cent., and salts, 0.88 per cent.

IV. Ass.

Average fat, 2.9 per cent.; sugar, 6.7 per cent.; casein, 1.2 per

cent.; salts, 0.4 per cent. The fat may be much lower than the above average, being at times 0.3 per cent.

The salts in milk are in inverse proportion to the length of lactation of the species, and thus the mineral needs of the growing animal are supplied equally well in short and long lactations. In general, the more cold the season the more fat in the milk. Humidity increases the quality of the milk. The best human milk is usually given between the ages of twenty and thirty years. Milk of a multipara is more abundant and a little richer than a primipara.

During menstruation there is no marked change in the milk, and it would seem that toxic products of unknown nature passed out through it at this time. Analyses do not show that the composition of milk is materially changed during pregnancy; however, some writers consider the milk of pregnant women poisonous. Moderate sexual indulgence is admitted not to have any notable influence on the secretion of milk.

FRITZ B. TALBOT.

MEYER, L. F.: THE METABOLISM OF ALIMENTARY DECOMPOSITION. (*Jahrb. für Kinderh.*, April, 1910, p. 379.)

Meyer concludes, as a result of his researches, that the stages of "disturbed balance" and of "decomposition" cause considerable alteration in the ash metabolism. The loss of single mineral components when more fat is added to the food (previously determined by Czerny's school) was established with ordinary milk mixtures. The condition of the child and the character of its stools made a difference in the kind of ash lost. In the stage of disturbed balance there was a loss of calcium and magnesium as long as the stools were of the "fatty-soap" type. In the stage of decomposition with diarrhea, there was a marked loss of alkalis. As long as "fat-soap" stools are present the loss of fat is hardly less than normal; diarrhea causes an increased loss of fat. Breast milk causes (as a result of its lower percentages in ash and nitrogen) first a further lowering of the ash and nitrogen balance. Then, in a longer or shorter time after the commencement of breast milk, comes a decrease in the loss of ash and nitrogen until there is again retention of both. First chlorides and calcium give a positive balance. Quickly after the institution of breast milk there is a marked improvement in the fat absorption, and coincident with this comes a change in the clinical picture.

FRITZ B. TALBOT.

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BOOK REVIEW.

SPONDYLOTHERAPY, SPINAL CONCUSSION AND THE APPLICATION OF OTHER METHODS TO THE SPINE IN THE TREATMENT OF DISEASE. By ALBERT ABRAMS, A.M., M.D., F.R.M.S., Consulting Physician to the Mount Zion and French Hospital, San Francisco. Pp. 400. Illustrated. San Francisco, Cal.: The Philopolis Press, 1910.

In this book the author attempts to give a rational explanation and a reasonable therapy for those diseases affected by the spinal reflexes. The work has been very painstakingly done and the book is full of anatomical and physiological information, which it does one good to recall as well as to consider in connection with the author's methods of concussion and sinusoidalization. Whether or not the alleviation of a multitude of disorders by affecting the spinal nerves and reflexes will prove successful and lasting, only time and a multitude of observers will tell; but Dr. Abrams' contribution deserves, and will repay, the most careful consideration.

BOOKS RECEIVED.

SERUM DIAGNOSIS OF SYPHILIS AND THE BUTYRIC ACID TEST FOR SYPHILIS. By HIDEYO NOGUCHI, M.D., M.Sc. Philadelphia and London: J. B. Lippincott Co., 1910.

THE CARE OF THE CHILD. By MRS. BURTON CHANCE. Philadelphia: The Penn Publishing Co.

THE FAMILY HEALTH. By MYER SOLIS-COHEN, M.D., Philadelphia: The Penn Publishing Co.

EDUCATION IN SEXUAL PHYSIOLOGY AND HYGIENE. By PHILIP ZENNER, M.D. Cincinnati, O.: The Robt. Clarke Co.

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ORIGINAL COMMUNICATIONS.

EXPERIMENTAL EPIDEMIC POLIOMYELITIS AND ITS RELATION TO HUMAN BEINGS.*

BY SIMON FLEXNER, M.D.,

New York.

In addressing the two societies on the subject of "Experimental Epidemic Poliomyelitis," I shall confine myself to the essential points of this investigation, with especial reference to the clinical data that have been so well presented by the two speakers preceding me. As you now know, in the last few months it has been demonstrated with certainty that a disease agreeing both in clinical types and in pathologic symptoms with anterior poliomyelitis can be produced regularly in certain of the lower animals; and my own opinion is that the knowledge of this disease has

* Presented at a Joint Session of the American Pediatric Society and the American Orthopedic Association, Washington, May 4, 1910.

been greatly extended by the fact of this transmission, and that the hope of the final conquest of the disease lies, perhaps, along the direction of this experimental work. I trust that you will not consider that I overemphasize this point, because I am myself only an experimentalist; but in view of the history of the disease, it seems that the hopeful aspect comes from this circumstance (as has been the case with other diseases that were formerly entirely baffling): that it can be transmitted regularly to the lower animals, in which it can be studied in all its relations.

This transmission, up to the present time, has been accomplished only in connection with the higher of the lower animals; that is, in the monkeys, including the anthropoid apes and the lower species. It is a perfectly simple thing to do. It is merely necessary to bring some of the central nervous system (perhaps, best, the spinal cord) of an infected human being who has succumbed to the disease before it has become chronic into intimate relationship with the central nervous system of these animals. In our own experiments we have employed the spinal cord from 3 children, who succumbed in the first week or two of the disease; and have made the inoculations directly into the brain, with some few exceptions, making a small trephine opening into the skull, and injecting minute quantities of a suspension of this matter directly into the substance of the brain. The animals having been anesthetized, there was no discomfort.

There are no immediate effects following the injections. The animals quickly recover after the effects of the anesthetic disappear; and for a variable period they are perfectly well. Then, after the expiration of this period of time, which is calculated as the incubation period of the disease, they almost without exception come down with symptoms comparable in all respects with those of the human disease. For this statement we have the evidence of those who are familiar with the human disease and have been kind enough to study these animals, especially Dr. Holt, who has given considerable time to it, and who states that the clinical appearances are indistinguishable from those of the human disease.

Although this is the most certain method of transmitting the virus, it is possible to transmit it in other ways. Indeed, there are no ways, I think, in which the virus, having been introduced beneath the skin or into the mucous membranes, may not set up the disease. It can be produced by injecting into the peritoneal cavity, into the subcutaneous tissue, or directly into the circulation; but

these means are less certain than is the means of direct inoculation into the nervous tissue. By means of the latter method the disease can be produced in from 90 to 100 per cent. of all animals infected. By the other modes of infection the disease develops very irregularly; and it has not been possible to continue throughout a long series the transmission of the virus by any other method than that of direct inoculation into the nervous system, with one exception, to which I will refer in a few moments.

The spinal cord and the brain of animals succumbing to the disease, or those of animals killed during the first week of the disease or after a somewhat longer period, are just as infectious as was the original human virus. The question, therefore, arises: In what does this infection consist? We have made a most painstaking study of the materials, the nervous system and other parts of the body, by every means which we can now command, for the purpose of demonstrating a visible microorganism, and have not succeeded in finding anything that would account for the symptoms and conditions produced. That the active agent is a living virus must be assumed from the fact that this transmission can be continued over a long, and perhaps an indefinite, period of time, and through an indefinite number of animals. We possess viruses that have been transmitted through twenty generations of monkeys and are now more active than at the beginning. It is not conceivable, therefore, that this matter that we originally used contained a soluble injurious agent, which has gone on reappearing in the successive series of animals, and which we are still transmitting in a sufficient state of concentration to produce these results. We believe that the virus is a living thing, transmitted as a living organism from one animal to another, and in sufficient amount in each case to produce the characteristic effects of the disease.

It became apparent, in the course of the efforts made to discover the nature of the virus, that it is extremely minute. If suspensions of the nervous system containing it are passed through the closest filter, the clear filtrate is found to be quite as active as the original emulsion—how active, may be illustrated by the fact that if a quantity equivalent to one-hundredth of a cubic centimeter of this fluid, which is a mere extract of the nervous system, is brought into the brain of a monkey in the manner described it will produce the disease. Therefore, I may say that the indications are that this active agent belongs to the class

of so-called filterable viruses; that is to say, viruses of ultra-microscopic size, so small that they cannot be revealed by the most powerful microscope. They cannot be discovered by means of the ultramicroscope, which shows minute particles of proteid in solution or in dilute serum. Moreover, even if these poisonous substances can be seen in these fluids under the ultramicroscope, there is no way of distinguishing them from the protein molecules therein contained.

We believe that the virus is a filtrate virus, of which we know other examples, causing destructive diseases. At one stage of yellow fever in human beings the virus is filterable; and the virus of dengue is also filterable. The virus of rabies is filterable, but it must be relatively much larger than the virus of poliomyelitis, because it filters with difficulty, and only through relatively coarse filters; whereas that of poliomyelitis is filtered with ease through the finest filter of which we have any knowledge.

We have no complete evidence of its being possible to cultivate the virus outside the body. We have obtained changes in culture-fluids, indicating increase of the virus; but we have not been able to transmit the disease by means of such fluids. The reason for this is not clear. One possibility is that we have not really cultivated the virus; but that the changes observed were produced by transferred ferments, and another is that the virus does not stand artificial conditions of growth very well, but is adapted only for a parasitic mode of existence. When forced to undergo the saprophytic one, therefore, it loses its pathogenic properties. This, however, is mere speculation. We do not really know that the cultivation has been actually accomplished.

I mentioned, a short time ago, that the disease as produced in monkeys presents the clinical aspects of the human disease. It should be added that it is a highly fatal disease in these animals. There is no real comparison between the fatality of poliomyelitis in monkeys and in human beings. You have learned how variable is its mortality in human beings during spontaneous epidemics. While it has been reported to be as great as 30 per cent., or even more, the average mortality is nearer 5 per cent. In monkeys, on the other hand, it is from 50 to 100 per cent. In the first 80 monkeys infected, the mortality was 50 per cent., but recently we have not been successful in saving a single monkey that developed the disease—the mortality, therefore, being 100 per cent. In other words—I place emphasis on this point—the experimental disease

is not only identical with the spontaneous with respect to its clinical appearances, and also in respect to its pathologic lesions (since the study of the central nervous system microscopically has developed the fact that the lesions of the disease in the monkeys are not to be distinguished from those in human beings), but also that the effects of the experimental disease are much more intense upon these animals than those of the spontaneous disease are upon human beings.

Now the varieties of the spontaneous disease are reproduced in the experimental disease. The distribution of the paralysis in the experimental disease is the same as in the spontaneous; the occasional involvement of the brain, the involvement also of the higher centers, all occur in the experimental disease, and perhaps with about the same frequency as in the spontaneous.

The question of the incubation period in animals has been given attention, because it was believed that it might throw some light upon the incubation period in human beings, as well as upon the so-called sporadic cases in human beings. In monkeys, by the direct mode of inoculation, the period varied from three to thirty days, the average period being seven, eight, or nine. The animals sometimes develop the disease about three days after inoculation. Of far greater interest, however, is the fact that the animal inoculated with the virus may remain in good health until thirty or more days after inoculation, when the symptoms suddenly appear unmistakably, and the pathologic examination shows the animal to have acquired the disease; further inoculation showing that the virus survived in living form. What we speak of as the sporadic cases of the disease in the intervals between epidemics, but not occurring altogether independently of epidemics (the latter point not having been sufficiently studied), may, after all, not be cases of reinfection; for instance, the cases appearing now, or two or three months ago, in localities in which there were a number of cases during the last summer, may have been cases in which the infection occurred at the time of the epidemic, but which, for some reason not yet understood, have been delayed in respect to development until circumstances favored the breaking out into unmistakable examples of the disease.

Let me again draw your attention to rabies, because there are similarities in the lesions in these two diseases. Recall how long a period may elapse between the introduction of the virus and the development of the symptoms of rabies. I should not, therefore,

be so sure that these examples of the sporadic occurrence of poliomyelitis do not represent, similarly, cases of infection and of delayed appearance of the characteristic symptoms.

I have mentioned the fact that there is one other mode of infection of this disease that gives results almost as constant as those following the method of direct inoculation into the brain. The number of instances observed is not yet so great as with the direct cerebral inoculation, but the results are much more constant than those following any other mode, except the intracerebral, by which the virus is brought into the body. We have been greatly interested in the question as to how spontaneous infection in human beings takes place, and have recently concluded that, in all probability, the virus being of the nature that I have described, it does not lead a prolonged saprophytic existence outside the body. Therefore, we have assumed that it is kept alive in the body, and that its chief place of increase is the central nervous system; because that is where it develops and produces its effects, the remainder of the body being only slightly involved in the pathologic process. For this reason we have considered the channels through which the virus established in the central nervous system leaves the body.

There are several possibilities. The virus might leave with the ordinary excretions, from the kidneys, intestines, etc., but we have not found it in the urine or the dejecta. There would be no difficulty in finding it there if it were present. Since it is filterable, all bacteria can be excluded. We have also taken into account the direct and intimate connection existing between the membranes of the brain and the nasal and pharyngeal mucosa, and have thought it possible that the excretion of the virus might be through these channels. We have removed the mucosa of the nose and throat, including the tonsils from animals succumbing to the disease, breaking it up into particles and suspending this emulsion; and have found the filtrate to be active. The mucous membrane of the nose and throat, therefore, contains the virus. Its containing it might, however, be merely accidental, in connection with the blood that these parts contain; but we have satisfied ourselves that the blood is not highly infectious in the height of the disease. It is possible to produce the disease in other animals by injecting a large amount of the blood, but small amounts do not set up the disease. We believe, therefore, that the blood can be excluded as a carrier of the infection. In all probability the membrane of the nose and throat becomes infected more severely

because of the close proximity to the membranes of the brain and cord than other parts of the body, and because of their direct connection. In other words, the poison probably leaves the body in this situation in active form. If this view is true in the human disease, it points at once to the application of practical preventive measures that will destroy the virus in those infected and prevent its being communicated to other persons.

So much having been gained, the question arose whether the virus could be made to enter the body in the opposite direction. Having in mind the way in which infection takes place in epidemics, and having established by means of pathologic studies that the first lesions occur in the membranes of the brain and cord, we found that the membranes become infiltrated with cells of the mononuclear type, and not by the polynuclear leukocyte. We also discovered that the paralyses are really accidental effects of the disease; that the poison does not exert its action against the ganglion cells, but simply interferes with the circulation; and that it is because of the interference with the circulation that the paralysis occurs. It seems that the membranes are the seat of the primary lesion. The close lymphatic connection existing between the nose and the membranes of the brain might be the path through which the virus finds entrance into the brain, and this idea was put to the test.

The intact nasal mucosa in the monkey has, thus far, not been found subject to inoculation that leads to the production of the disease, but it requires merely a small amount of traumatism to open up the way and lead to infection. Other membranes do not behave in this way; there is something peculiar in this membrane that renders it highly susceptible. The virus travels from the nose to the meninges along the olfactory nerves, and gains entrance to the membranes of the cord and localizes in the manner so familiar. I have a dissection of an animal infected in this way, showing the lesion. The nose has not been opened, but you can look in from above and see the hemorrhagic lesion and the close proximity of the olfactory bulbs to the nasal mucosa. The connection is bridged by the olfactory nerves, and the separation is only a line. It is a direct mode of connection between the two structures. You will see the congestion developing about the meninges. This animal came down with the disease three days after the inoculation of the nasal mucosa.

These are points of such practical significance that I trust I have not overemphasized them. I intended to emphasize them, because you are the ones who have to deal with the disease in man, and perhaps these facts developed through experimentation may be utilized by you. There are also one or two other points of interest.

Dr. Holt alluded to the fact that there are changes in the cerebrospinal fluid of the monkey. These changes are unmistakable. Before the appearance of the symptoms you can tell by this means which animals will come down with the disease. Often, a number of days before the symptoms appear, the cerebrospinal fluid is altered. The protein increases, and this fact can be demonstrated by any method that shows increase in protein. There is also an increase in cells—partly polymorphonuclear leukocytes, and partly mononuclear leukocytes; but you do not have a turbid fluid that arouses your attention, but a clear fluid. Specimens have been taken from the cerebrospinal fluid in children, and found clear and to contain an excess of lymphocytes; but these observations were made late in the disease. If, however, lumbar puncture is made day by day, there is a point in the disease in monkeys at which the fluid is changed perceptibly in ocular appearance. This period in human beings is, of course, overlooked, because it lasts only one or two days, and then the fluid returns to its previous condition. The paralysis, however, has then already set in. This period coincides with the interval just before the paralysis, and does not last long after the paralysis is established—which I take to mean that the height of the disease is reached at the period of the paralysis, after which there is recession of the pathologic process, the damage having already been done.

Now there is another point of practical interest, namely, that the animals that have recovered from the disease are not subject to inoculation. An attack of the disease appears to afford immunity. It would be interesting to learn whether the same is true of the disease in human beings. This is not the only point of great significance with reference to this fact. It has been found that the blood of the animals recovering and having immunity is capable of neutralizing the virus. When the virus is mixed with the serum and injected, the animals do not develop the disease. We have also been able to show that the blood of children who have recovered from poliomyelitis also possesses this power. To

one with animals at his command this discovery leads to another form of experimentation. If it is possible to neutralize the virus by direct mixture outside the body before inoculation, the question at once arises, Is it possible to neutralize the virus after inoculation into the nervous system? It is possible, but to what extent I cannot say, because our experiments have not been sufficient in number or in duration to allow of my making a statement. I may say, however, that in animals and persons recovered from the disease there remains for a long time in the circulating blood a substance neutralizing and antagonizing this virus. This is a hopeful situation. Should means be found to make an early diagnosis of this disease in human beings, as in monkeys, some influence may be exerted over the ultimate development of it, now that we have in our hands a definite antidotal substance. Much will depend upon our ability to increase the value of this antidote by subsequent immunization, and upon our ability to find lower animals capable of immunization. It is too early to say whether anything can be accomplished in this direction or not, but what has been stated is none the less of great significance. It is probable that only during the prevalence of an epidemic would one's attention be sufficiently directed to the disease to make the diagnosis in advance of the paralysis; but from what has been said about the cases that are abortive or entirely recover, and in view of the fact that the meninges and the vessels are chiefly affected, it is not outside the bounds of possible human achievement to influence the disease favorably under the circumstances mentioned. Taking into account what I have said, that the subject is in a very early stage of development, I may still add that I think the disease will come to be influenced favorably by the use of some antidotal substance. Since in monkeys the disease is so much more severe than in human beings, if we can interrupt the process in them there is greater hope that it can be interrupted in human beings.

The situation in this case is reversed. It is usually easier to affect favorably an animal disease, which is experimental, than a human disease, which is natural to the species. The conditions are reversed, since the experimental disease in this instance is so much more severe than the spontaneous disease. We have observed no example of the spontaneous communication of the disease to a healthy monkey. In view of what has been said about the communicability of this disease in human beings, with which I wholly

concur, it seems strange that there is no evidence of that kind in respect to animals. Perhaps the reason is that it is impossible to make a direct infection by means of any channel, unless some injury is instituted, as, for example, the scarification of the nasal mucosa, or the penetration of the dura and the brain substance in inoculating the brain. Therefore, these animals are not naturally subject to this disease. We have to create a traumatism in order to produce it. That point may suffice to explain why this communication has not taken place, although under our experimental conditions the opportunity for direct transfer of the virus was frequently present.

TREATMENT FOR PINWORMS.—According to W. Zinn (*Therap. Monatshft.*, January, 1910) pinworms frequently penetrate the mucous membrane of the intestines, where they eventually form calcareous nodes. It is also likely that many cases of appendicitis are caused by these parasites, though this applies only to the milder cases of childhood. As the fertilized female wanders out through the anus, intense itching results. The eggs will readily be deposited on the fingers and under the finger-nails, and reinfection is thus likely. Often all the members of one family will be infected.

The following treatment is recommended (doses for adults): First day, fluid or semi-solid diet; at three o'clock calomel and jalap, of each 0.5 grams ($7\frac{1}{2}$ grains); at six o'clock a soap enema, warm, 1 to $2\frac{1}{2}$ quarts. Second day, fluid diet, with two to four buttered rolls, and in the morning one cup of black coffee. At eight, ten and twelve o'clock a powder containing santonin 0.05 grams ($\frac{5}{6}$ grains) and calomel, 0.1 grams ($1\frac{1}{2}$ grains). At two o'clock 1 ounce of castor oil, to be repeated, if necessary, at four o'clock. Third day, fluid and soft solid diet; in the morning a warm bath. In the morning and afternoon an enema of 1 to $2\frac{1}{2}$ quarts of 0.2 to 0.5 per cent. solution of green soap. Fourth and fifth days, as above, with a warm bath in the evening. Before meals and after stools the hands should be carefully disinfected. After the cure, the linen and bed sheets should be changed. The cure is best carried out in a hospital, where a careful control is possible. Instead of soap, one of the anthelmintics, such as extract of male fern, may be used in the enemas.

THE FIRST HEART SOUND IN CHILDREN.*

BY F. FORCHHEIMER, M.D.,

Cincinnati, O.

If one were inclined to believe that, after so long a time in which the normal heart sounds have been studied, there is a consensus of opinion among authors in regard to their production, a review of the literature would be disappointing. Indeed, in many things connected with heart diseases the statements of various authors are so much at variance as to seem almost incredible; one need only look at the descriptions of compensatory changes in valvular diseases to verify this.

In connection with the normal first sound of the heart there still exists much difference of opinion; but upon the whole certain modes of its production are accepted by the majority of authors, many of them differing as to details. As will be seen, I have preferred the term sound to that of tone, as the vibrations which we normally perceive over the heart are not sufficiently regular to produce a tone. And yet any one with a trained ear for music can determine the pitch of the first sound. This pitch depends, as I believe, not upon an overtone due to a combination of all the factors which go to make up the first sound of the heart, but upon its most important factor. In children the pitch is high, depending upon the age and size of the child, from *g* or *a* soprano below the staff, gradually becoming lower, until in a large male adult it reaches double *d* soprano below the staff (Landois).

The dominant factor in the production of the first sound is the systolic contraction of the myocardium. Next to this in importance is the vibration produced by the tense auriculo-ventricular valve; then those vibrations occurring in the large vessels when they are made more tense and lastly, and a little later, by the vibration of the semilunar valves. All this takes place during

* Read by title at the Twenty-second Annual Meeting of the American Pediatric Society, Washington, D. C., May, 1910.

systole and all of it has been proven by clinical experience, so that instead of accepting only two factors for each side of the heart, four in all, we are forced to accept four for each side, *i.e.*, eight as the number of component parts of the first sound of the heart.

These then are the factors which enter into the production of the first sound of the heart, but specifically of the adult, as to duration, sound quality and accent or rhythm. In the child heart the conditions are still more complicated. As we are dealing with an organ slowly developing from the condition immediately after birth to that of adult life, there must, of necessity, be transitory and transitional phases which depend upon certain periods of development, broadly stated as existing from birth to the completion of the third or fourth year, from that time to sexual development and, finally, the adult period. But this manifestly holds good only as a general rule, to which many exceptions are found in individual cases. The first and probably the most important factor involved in the production of these changes is found in the size of the myocardium, which can be expressed by the ratio of the weight of the heart to the weight of the whole body. The following figures taken from Vierordt (*Daten. u. Tabellen für Mediziner*, 1906) show us that at birth it is 0.76 of the weight, gradually going down to 0.46 at the completion of the first year, then ascending until the end of the third or fourth year, when it reaches 0.53, then again falling to the tenth year to 0.41, gradually ascending to a maximum of 0.51 at the completion of the seventeenth year. The conclusion that may be drawn from this, as to the first sound, is that wherever the ratio between myocardium and body weight is great, the first sound will be strong; wherever it is low, it will be relatively weak—this I believe to have been able to verify by experience.

But there are other factors besides the size of the myocardium which must be considered in children in connection with our subject; not the least important being the question of elasticity of the myocardium, which has not received sufficient attention from clinicians so far as children are concerned. Melnikow-Raswedekow (*v. infra Fahr*) first showed that in the newly-born, elastic fibers are present only in the peri- and endocardium in the neighborhood of the large blood vessels, and none around the muscular elements of the myocardium, the latter being found only in adults. Fahr, who took up the subject again (*Virchow's Archiv.*, Bd. 185, XVIII., Vol. V., p. 29), verifies these statements, to

which he adds the following: As a rule, the elastic tissue develops around the muscular cells about the fifth year of life and is completed at the end of the seventh year. In view of relations of weight of heart to weight of body, referred to above, it is interesting to note that increase in elastic tissue and increase in weight seem to occur at about the same time of life. The normal function of this elastic tissue is to cause dilatation of the heart, and in the adult diastole is due principally to this cause. In the newly born the elasticity of the muscular cells alone seems sufficient, and at the fourth year there begins the action of the elastic tissue and muscular elasticity which finally gives way to the preponderance of elastic tissue diastole by the end of the seventh year. Diastole increased by the elastic tissue affects the first sound, as the greater it becomes the more blood flows into the ventricle during a given time, the greater will the systole become, and the more marked the first sound. To those who believe in the myogenic theory of the heart's action, all changes in rhythm are due to the automatic properties of the myocardium. However this may be, in children we normally find the infantile type of arrhythmia, in which the intensity and duration of the first sound are changed. Beyond this it is not my intention to enter into the discussion of the first sound in this connection, but not being able to accept the myogenic theory as explaining all, as Engelmann and others have put forth, it becomes necessary to call attention to some of the effects of the nervous system upon the first sound of the heart in children.

As Soltmann first showed, the great difference between nervous reaction in young and old animals lies in inhibition; in the young it is slightly developed, in the old more or less perfectly. This in children means a rapid pulse rate due to lack of cardiac inhibition; the difference in pulse rate in an infant awake and asleep is an example of this mechanism; but the difference in the first sound of the heart is not less remarkable; short, sharp, almost accentuated in the infant awake; longer, duller and not accentuated in the infant asleep. Gradually these differences disappear, but in certain individuals they last for a long time, especially in neurotic children.

Finally, the absolutely small weight of the heart must be mentioned—from 17.2 gm. in the first months to 41.2 gm. at the conclusion of the first year; 130.0 gm. at ten years as compared with 311.1 gm. at twenty-two years in the male and 253.5 gm. in the female (Vierordt), representing a sevenfold increase in

weight in adult life. It must be admitted that if our premises as to the formation of the first heart sound are correct, a small vibrating mass will produce an altogether different sound from that of a large one.

All the various factors mentioned may, under proper circumstances, be followed by a change, the most important of which is called a bruit or a murmur. The division which Sahli makes of these has always appealed to me; it is as follows: (1) Organic and functional valvular murmurs. (2) Accidental murmurs. Both of these classes are of so much importance in children that a more or less detailed description is necessary. Whoever undertakes to make a diagnosis of a heart lesion in a child under three or four years of age in an offhanded manner and without due care and consideration, immediately stamps himself a dilettanté in heart diseases. Even the detection of bruits and their relation to the sounds may become difficult in these cases, due to the rapidity of succession of sounds, the peculiar rhythm in infants, and the intractability of children at the age of three or four years. But even when a bruit with the first sound of the heart is found, it is difficult to make out its significance. Traube first made the statement that the diagnosis of mitral insufficiency is the most difficult of all valvular diseases; the systolic bruit may follow an organic or a functional condition, or even be accidental. In addition the accentuation of the second pulmonary sound is of little value for diagnostic purposes, first, because it so frequently occurs in children who have no heart disease, and, secondly, it exists in both organic and functional valvular conditions in older children. In older children it frequently is of no value in accidental bruits. Moreover, in children it is difficult to say positively whether this systolic bruit is stronger over the usual auscultatory locations of the pulmonary or the mitral valves. It is true, we may be guided here by its conduction and frequently, but not always, by compensatory changes. Organic valvular systolic bruits acquired after birth are found in children at the apex in peri- and endocarditis, in mitral and tricuspid insufficiency, at the base in aortic stenosis, rarely in pulmonary stenosis. In congenital cardiac diseases they are found in pulmonary stenosis, stenosis of the mitral and tricuspid valves, defects in the ventricular septum and patency of the ductus arteriosus. An easy way for differentiating organic from other valvular bruits in children under three years of age has been given—one might almost say with a stroke of the pen—

by Hochsinger. He says that under three years of age all bruits in the heart are organic. It is strange how widely this statement has been accepted. Even Romberg, in his excellent book (*Die Krankheiten d. Herzen u. d. Blutgefässe*, 1906, pp. 52, 185 and 220) comes back to it again and again and bases absolute differential diagnosis upon it. For the complete literature on the subject up to 1906, reference may be had to the excellent paper of Hamill and le Boutillier, which was read before this society—"Inorganic Late Systolic Pulmonary Murmurs in Infancy and Childhood" (*American Journal of Medical Science*, 1907, Vol. CXXXIII., p. 55-66). I fully concur with these authors in the view they have expressed. If we disregard the reasoning employed by Hochsinger, experience will have taught us that in children under three years functional and accidental bruits are found very commonly. Especially is this the case in infants, and principally systolic bruits. A further statement is made to uphold Hochsinger's view that organic bruits disappear because the lesion in an affected valve may disappear during childhood or later. This assertion cannot be denied, as we all have seen what we considered organic bruits disappear, but this is extremely rare, especially when the frequency with which bruits come and go in children's hearts is taken into consideration.

The systolic functional valvular murmur—and here we refer only to the auriculo-ventricular valves—usually depends upon a distention of the orifice of their insertion, followed by a relative insufficiency caused by an impossibility of complete restraint by the papillary muscles. They are very common in children and depend largely upon myocardial conditions. It is difficult to say which form of myocardial disturbance most frequently produces systolic bruits at the apex. If the statement of Schmaltz (*Zur Kenntniss der Herzstörungen in Scharlach u. ihre Folgen. Münch. Med. Woch.*, 1904, p. 32), that the most frequent heart lesion in scarlatina is an acute myocarditis and not endocarditis is true, in which he agrees with Romberg, we must consider acute myocarditis as the most common cause. This observer found, upon postmortem examination of scarlatinal patients, only 3 cases out of 33 which had endocarditis. Romberg (*Erkrankungen des Herzmuskels bei Typhus, Scharlach u. Diphtherie, Deutsches. Archiv. f. Klin. Med.*, Vol. XLVIII., p. 387) found, upon postmortem examination (method of Krehl) in 11 cases, 8 with myocarditis, 8 with pericarditis and 5 with endocarditis. We also find

systolic apical bruits with the same mechanism in all other forms of acute myocarditis, due to diphtheria, typhoid, rheumatic fever, variola, gonorrhea and septicopyemia. For reasons that are self-evident they are also found in acute nephritis. I have seen a number of children who with every attack of high fever have a systolic bruit at the apex which grows louder with increase, and fainter with decrease, in temperature, which does not exist when the patient is well. One of my patients has been under my observation for over twenty years; he has grown to manhood and his heart seems to be perfectly normal. Another one, of the same class, had, when he was fifteen years of age, an acute dilatation of the heart, due to tennis, from which he, after eighteen months and now at the age of thirty years, also seems perfectly well. Schmaltz, in the article referred to, calls attention to a febrile bruit in scarlatina. But it would seem that the production of the bruit in the 2 cases just mentioned might depend upon different causes; in the first case it might be due to increase in expulsion of blood combined with low blood pressure (an accidental bruit); in the second it is possible that there was a slightly damaged heart from acute myocarditis, especially as the boy had had rheumatic fever.

In chorea the bruit is produced by acute endocarditis. Possibly it may be an accidental bruit, and by some it is supposed to be a disturbance in innervation of the papillary muscles or of the myocardium itself.

In acute dilation of the heart due to excessive use, especially when the heart is in a transitory period of growth, the bruit is frequently found. I have in a few instances of chorea of the grave form also found enlargement of the heart, with systolic, as well as with diastolic, bruits.

The accidental bruits which are not produced in the valves and which exist without apparent lesions are many in children. We do not err when we say that the mechanism of their production is not satisfactorily explained, certainly there is no general consensus of opinion on the subject. The one most commonly found in children is the systolic bruit over the pulmonary valve, to which attention has been again called by the articles of Hamill and le Boutillier (l. c.) and Lüthje (*Zur Physikalischen Diagnostik-am Herzen, Speziell üb. Systolische Geräusche an d. Valvulamitralis u. Pulmonalis, Münch. Med. Woch., 1907, Vol. LIV., p. 49*), both of these articles appearing at about the same time. The first-

named authors report 80 cases and the latter one has found it present, alone or combined with a mitral systolic bruit, in 612 children out of 854 which he examined in Erlangen. It is systolic, usually late in systole. Hamill and le Boutillier state that it is superadded to the first sound, occupying the greater part of the systolic interval, but more frequently its early portion. It is best heard over the pulmonary, but may also be heard over the mitral valve. It is best heard in the recumbent position, at the end of inspiration, disappears upon forced inspiration and increases upon forced expiration. It may be transmitted and conducted to the vessels in the neck. There is no compensatory hypertrophy.

Many explanations have been offered for this bruit, which have been given in the first of the two articles just mentioned. Lüthje (l. c.) has added another one; he claims it to be not impossible (*nicht unwahrscheinlich*), that it is a pulmonary stenotic bruit. From his report alone one is not able to decide whether an ordinary stenosis or some other form is referred to. The only conclusion one can arrive at in this regard may be obtained from the remarks which Schott makes in the discussion, when he says he does not believe this bruit due to change of posture. As Lüthje does not describe any compensatory changes, it is not reasonable to suppose that so excellent an observer would consider the bruit, which never has the character of an organic stenotic bruit, as due to changes in the valve. Moreover, it would be unreasonable to imagine that so many cases of organic pulmonary stenosis exist as reported here by so many authors, which disappear entirely. It has seemed to me that if the development of the elastic tissue in the myocardium, referred to before, is taken into consideration, the bruit might also be explained. During diastole the elastic fibers, which are present in the youngest children around the large vessels, on account of their elasticity contract away from the lumen of the conus arteriosus and the vessels; during the systole they are crowded back by the contraction of the myocardium. If there be a disparity between the strength of the myocardium and the resistance of the elastic fibers, there will result more or less of an inequality in the conus arteriosus, which acts as an obstacle. When the blood passes over this a bruit is produced. This bruit must of necessity be heard most frequently and most intensely at the end of systole, for it is then that the greatest force of the myocardium is expended at a given place, just as in mitral stenosis this increased force at the same time causes greater

velocity of blood current. But the relative disparity may be so great as to cause an obstruction during the whole of the systole, then the bruit develops early in systole which, in fact, is the more frequently the case the younger the child. On the left side of the heart this condition cannot exist, as the left myocardium is already so much more developed, so that the elastic hindrance is easily removed. In younger children it is, therefore, more frequently heard, but in accordance with this explanation the bruit may be produced and is produced until the adult heart develops, as late as eighteen years.

As far as the other systolic accidental murmurs are concerned, as Sahli says, "their real origin still remains unproved." An exception must be made for the cardiopulmonary bruit, rare in children, whose origin is self-evident. For the origin of the others many things have been considered—the irregularity of the inner surface of the heart, the possibility of temporary obstruction at the place of junction of the arteries with the ventricles, the rapidity of the blood current, the quality of the blood (possibly its viscosity), the diastolic filling of the ventricles and the rapidity of expulsion, the condition of the myocardium, the peripheral blood pressure and nervous conditions. Under these conditions, as Sahli suggests, it is easier to say why a bruit should be present than absent.

The anemic bruit can, then, be easily explained; that it is directly produced by anemia is a matter of some doubt. Certain it is that in many cases of anemia there is no bruit, and many bruits are attributed to anemia which are due to other causes. On the other hand, cases of oligochromemia of a severe type, below 25 per cent. Hb., usually have accidental bruits, it matters not what the form of anemia may be. It is certainly impossible to diagnosticate anemia by listening to the heart, and while the "anemic bruit" must still be retained in the present state of our knowledge, the general condition must be first known, as well as all other causes, for the elimination of this bruit. The same may be said for the bruits in general debility and in fever. All other bruits must be excluded before the accidental bruit is accepted in these conditions. Indeed, the careful diagnostician does this in every case, but with all precautions taken an error in diagnosis may, and sometimes does, occur.

THE HYGIENIC CARE AND MANAGEMENT OF NERVOUS CHILDREN.*

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The wisdom and foresight inspiring those who are responsible for this series of lectures and discussions has impressed me greatly. The subjects have been evidently selected with careful forethought and an unusual appreciation of the utilitarian to the disregard of less practical, if more academically attractive, topics. The value of such discussions from the standpoint of educational enlightenment and civic betterment and improved social economics is self-evident. That the Protectorate atmosphere of the Academy of Medicine should have been selected as the forum is both appropriate and auspicious as well as opportune.

Opportuneness and importance are, it seems to me, especially conspicuous in the announced subject for this afternoon. That you appreciate both facts I do not doubt. If I may, however, I should like to deepen your realization of both by reference to a phase of the subject which may have escaped your attention. The trend of medicine to-day is intrinsically toward prevention, and I might add conservation, at the moment a very popular word. Pathogenic microorganisms are surrendering, one by one and reluctantly, but steadily, to the bacteriologist. Improved hygiene and sanitation and the utilization more intelligently of natural resources are combining to lessen progressively the ravages of other morbid agencies. Mechanical medicine, including surgery, shares in the resulting benefit from all these factors and is, *per se*, tending, however tediously, toward perfection. Through these and other causes the foreordained ills entailed of heredity are less conspicuous and tend also toward a millennial minimum. We may get rid of tuberculosis, of diphtheria, of typhoid; the reproach of blind babies will disappear; surgical work will steadily decrease and its dangers eventually amount to *nil*; the Metchnikoffs of the future may find means to prolong life by retarding

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old age almost indefinitely, but the nervous child will be with us always. Not only is this true, but with each decade, as the inevitable consequence of unnatural social and other conditions incident to so-called progress and civilization, the nervous children will become progressively more numerous. Fifty years from now we will vaccinate for everything or neutralize at will with appropriate hormones. The active medical profession will consist of a few internists, a few refractionists, a small number of surgeons, a baker's dozen of obstetricians and a vast army of neurologists. Should our friends, the suffragettes, prevail, the obstetricians will become a negligible equation. As evidence that my prophetic inspiration comes not from partisan fancy alone, I call your attention to the published records of accomplished results from only a few years of intelligently applied preventive medicine here in New York among the children of the public schools and tenements. If such astounding benefit can be shown through the instrumentality of a system not yet ten years old, still in its infancy, and handicapped by a lack of public and professional coöperation and appreciation, what may we not expect of the future? Remember that such movements are never reversed and that sooner or later public approval and appreciation and professional coöperation will come, and when they do, who shall say what are to be the limitations?

Coming at once to the immediate subject, I am impressed with the necessity of considering or presenting it from two viewpoints. The two, in my opinion, are so intimately related, so subtly almost one and yet so radically differentiable—that some knowledge of each separately is essential to an intelligent interpretation and understanding of the other and of both. There are two kinds of nervous children—one normal and the other abnormal. Both are tremendously important potential factors in the future civic body. Broadly, and yet with strict accuracy, it may be said that all children are normally nervous and the non-nervous or unduly phlegmatic child is much more rationally an object of solicitude and suspicion than is the opposite type. The activity of growth and development, the incessant accession of new functions of the nervous system peculiar to childhood is associated with an inevitable instability, and instability of nervous action is in a sense, and very importantly, synonymous with nervousness. This hyperactivity of function is physiologically normal and, representing, as it does, alert receptivity and ready

impressionability, it is an educational and developmental asset of the highest value and should not be unduly inhibited or repressed. It is the nervous type in child and man who does things—who makes history and unmakes it, too, sometimes. Careful and intelligent oversight and tactful guidance into proper channels of outlet, rather than forceful restraint or inhibition, should be the governing principles. Laboratory enlightenment in physiology, chemistry and anatomy or academic pedagogy is not essential to the mother or teacher, however desirable. Common sense plus a little knowledge of one or two fundamental truths in neurophysiology is all the equipment required. It is well to know appreciatively first something of the wonderfully acute sensitiveness of nerves, and of the special sense nerves particularly, to all stimuli, resulting in impressions or percepts; correlated sense impressions or percepts, it should be remembered, form the basis of so-called ideas or concepts, the beginnings of mind. In the child these are simple, of course, but what the concept of a child lacks in elaborateness or complexity is more than offset in its ultimate effects by a relatively remarkable durability or permanence. That first impressions are the most lasting is a proverb based upon this physiological fact in childhood; when, later in life, we die at the top, to borrow from Swift, it is the memories of childhood which are the last, to fade.

The second neurophysiological fact to be remembered is that nerves—all nerves—motor, sensory, special and psychic—are intrinsically prone to form habits. The same stimulus to action induces more and more readily a response and the *same* response with each repetition of the stimulus. The final mature personality or individuality identifying each of us represents in a sense the more or less fixed habit reactions of our nerves to various stimuli. Accepting these statements as true—and they are incontrovertible—you can readily see their vital bearing upon the question of training and management through nervous childhood, normal or abnormal. Nerve habits are good or bad, exactly in accordance with the goodness or badness of the habitual stimulus. The highly organized, actively energized, alert, nervous child is the exquisitely susceptible type and therefore in greatest danger. As with some adults, so it is with children—some of them deserve no credit for being good, since goodness with such is an utterly negative quality. Dismissing for the moment, but by no means forgetting, the normally nervous child, what are we to do for the abnormal

or morbid nervousness in children? Prerequisite to any effective application of corrective methods is an intelligent understanding of the causes which induce such nervousness, many of which are preventable. A division under two heads is perhaps best for our purpose—specific, chiefly physical; and general, chiefly affecting the morale. Both divisions are arbitrary and the terms relative and the arrangement one of convenience. The intimacy of relationship between mental and physical should be held constantly in mind, as happily illustrated in the Latin aphorism *Mens sana in corpore sano*. Many of these physical causes of the grossly abnormal I shall merely mention, as they either have been or will be considered in other papers before this body. Children are equally with adults subject to many organic diseases of the nervous system, and there are several affections in neurology, as epilepsy and chorea, which are almost peculiar to childhood. The greater sensitiveness to damage of partly developed and still growing things in all nature explains the fact that malnutrition from poor food and bad air, depraved blood states secondary to acute diseases, toxic agents, among them tea, coffee, alcohol, tobacco and certain drugs; reflected irritation of the central nervous system from local diseases or irritation of the periphery are all positively and powerfully harmful agencies. Such causes are serious, however, only through ignorance, oversight or neglect. All are removable and their effects remediable. Measures of relief to be curatively effective, however, must be employed promptly; otherwise, and this is especially true of reflex irritants, bad habits will be quickly formed by the nerves affected, giving origin to one of the numerous afflictions known as habit neuroses, conspicuous examples of which are some of the *tics*, or habit spasms, certain speech defects and many other more subtle conditions not specifically designated by name or label. There are mental equivalents known as habit psychoses.

One of the most important and certainly the most interesting of all the organic causes of nervousness, normal and abnormal, is heredity. It is beyond question the cause concerning which, as regards the specific method of its operation, we know least. We do know that certain diseases, such as epilepsy, migraine, Huntington's chorea and deaf-mutism, are often distinctly hereditary. Indirect heredity in an instability or lessened resistance or endurance of the individual nerve cell is also common. Vicarious, or substitutive heredity, is another familiar phenomenon, by which

is meant the appearance in the progeny of a different, but related, clinical type of nervous disease from that affecting the parent. The determining responsibility of heredity is at times obscure. One or more generations may be skipped, sometimes with the result that some queer neurosis or psychosis will seem, like Topsy, to have come just so; which same queer neurosis or psychosis or eccentricity or manifestation of genius, for all these are kin, will be found to have had its exact or equivalent duplicate in a grandparent. The subject is attracting at this moment active scientific interest, among the workers being Mendel, a school of self-styled biometricians, and, in a supplemental way, Prof. Munsterberg in this country. So much briefly and very superficially for the organic causes of nervousness.

Of the second division of causes inducing nervousness in children, you will recall that I described them as chiefly affecting the morale. Perhaps it would be better to designate them as environmental, confining ourselves to special and direct environmental factors for this occasion. Of these, the first in practical and physiologic importance is the effect of example. The young animal, no matter what the species of the genus, is alike in the reaction of imitation. There is much of the monkey and the parrot in the child. I refer to the more serious, if less common, significance of this association. The first door open to what later becomes intelligence is that of imitation. Walking and talking are conspicuous examples of accomplishments acquired chiefly in this way. Later in life, but still early in childhood, a much more subtle development occurs, the effect of which is to make the child the imitative reflex—the mirror, so to speak—of his environment in a less conscious or subconscious way. The influence of example is too well known and accepted to require argument or academic demonstration. That it is at times almost final and absolute in making character and moulding personality, including nerve habits, is not appreciated in its significant bearing upon the management of nervous children. Good material gone wrong in the child does not necessarily reflect through heredity upon a grandparent. The coincidence of an irritably nervous or neurasthenic mother and a highly nervous child is far less indicative of heredity than of vicious example. More than once I have found the best treatment for a nervous child to have been some good advice or a prescription for the mother. The whole family or familiar atmosphere needs investigation—nervousness is catch-

ing, more so than measles—and a quarantine is often just as legitimately indicated to prevent a household epidemic.

Collateral in significance and importance to family or parental contagion is the ill effect and nervous irritation from nagging. It is essentially depreciative and, therefore, demoralizing, and demoralized self-confidence is invariably evident in objective nervousness. Nagging means repression, too, and it is a very easy thing to do harm by undue repression in childhood. Normally, children are objectively active, which means that they are restless and noisy and that a surplus energy is constantly, and in many ways, demanding an outlet for expression. Opportunity within liberal reason should not be denied them. Directly germane to this phase of the subject of family environment comes the matter of community atmosphere. False social customs, irritating conventionalities in dress and behavior, artificial physical conditions, unnatural companionship and associations, mental starvation on the one hand, and mentally indigestible gorgings on the other, are all inimical to normal nervous poise beyond question. Remember that not a sound nor a sight nor a sense stimulus of any kind within the field of the individual fails to make and to leave its impression and the nerves of children are not trained to discriminate, not toughened by digested experiences from past impressions. It is simply marvellous that here in New York or in any populous city all the children are not jumping jacks. Partial immunity by heredity from city-bred parents is doubtless of some neutralizing helpfulness, but the evils entailed of parental pride and ignorance, as illustrated in the methods of hot-house forcing educationally and in the acquisition of precocious accomplishments leaves the child still under a heavy handicap. Not one child in twenty in New York is properly or naturally fed, dressed, bathed or bedded. So crowded is the period of development and so forced the process that to find a real child in any one over the age of ten in New York City is as likely to reward the searcher as the proverbial needle in the haystack.

In conclusion, let me discount by anticipation the probable criticism that no specific régime has been advised, no specially itemized programme has been suggested, no drugs recommended. I have purposely omitted any reference to specific methods or detailed measures, preferring to leave with you what I believe to be far more vitally important, a brief review of the fundamental principles involved. I am the more convinced that this is wise

in that twenty years of experience have taught me the uselessness of arbitrary or routine systems, the danger of fads, and the absolute necessity of adapting the method to the personal equation of the child, always variable. There are difficulties, I admit, and much patience will be needed, but the game is worth the candle and there can be no insuperable obstacles in carrying out any programme the keynote of which is "back to nature."

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INFANTILE GLAUCOMA OR BUPHTHALMIA.—Wilfrid Allport (*British Medical Journal*, March 5, 1910) reports the case of a child, three years old, who had a marked buphthalmos. The corneæ were considerably enlarged, and showed extensive nebulous opacities. The tension was high, photophobia was present, and the sight was seriously impaired. In April he performed anterior sclerotomy on the right eye; the Graefe knife was carried across the anterior chamber, and the point emerged through the sclera on the other side. By a few sawing movements the intercalary region was incised on both sides of the cornea, leaving, however, a bridge of sclera intact at the upper part. Unfortunately these incisions healed very rapidly and firmly, and the tension soon became as high as ever. He then decided to alter the procedure, and in the following June he did an anterior sclerotomy on the other eye, but the incision was extended so as to cut entirely through the upper part of the intercalary region. The knife as it emerged through the sclera above the cornea was not allowed to cut through the conjunctiva, but this membrane was undermined for a few millimeters, producing a bridge of tissue, which held the flap-like portion of the cornea in position. The idea of this operation was to obtain a scar at the filtration angle which would be sufficiently loose and porous to allow the intraocular fluid to escape through it under the conjunctiva, and so produce a permanent drain. The result more than fulfilled his expectations, the tension soon becoming normal, and the symptoms gradually abated. In September a similar operation was performed on the other eye with an equally satisfactory result.

BIOLOGICAL VARIATIONS IN THE HIGHER CEREBRAL CENTERS CAUSING RETARDATION.*

BY E. BOSWORTH MCCREADY, M.D.,
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In a previous paper, read in Philadelphia,¹ I spoke of a cause of backwardness in school children, which I think is more common than is generally supposed, namely, congenital word-blindness, and reviewed the cases to be found in literature, beside reporting a case which had come under my own observation. Claiborne,² under the term congenital symbol-amblyopia, includes this condition with an incomplete congenital figure blindness, also speaks of incomplete congenital word-deafness as amblykusia and postulates an incomplete congenital musical-note deafness which he terms ambly-musia. He later³ includes stuttering in this class of defects. I will take up these conditions, in which I will include delay in the acquisition of speech, in detail.

Congenital word-blindness, or word amblyopia, is a condition which interferes with the stamping of word images upon that particular portion of the brain which through inheritance from generations of reading and writing ancestors has become specifically developed for their reception; the angular gyrus either alone or in association with part of the supramarginal lobule. That word-blindness occurs as a result of defective development, either intrauterine or as the result of injuries received during labor, there is no doubt. On account of the distinct hereditary and familial influence shown in a large number of the cases reported, and the lack of history of prolonged labor or birth injury, the evidence would seem to be greatly in favor of the condition being ontogenetic in origin. The term "biological variation" was suggested to me by Dr. Lightner Witmer for use in describing this class of cases. I will use it hereafter both for congenital word-blindness and conditions related to it.

Since the report mentioned above, another case has come under my observation. This case was exhibited before the College of Physicians, Pittsburg, on the 24th of March last. His history in detail is as follows:—

* Read before the National Association for the Study and Education of Exceptional Children, New York City, April 21, 1910.

CASE I. George T., aged thirteen years. Examined first on February 25, 1910. Entered school at the age of six years. His attendance had been very regular. He had progressed no further than the second grade, having missed five promotions. His teacher reported that he was very obedient and tried hard, but seemed unable to learn anything that required reading.

His family history was negative as far as anything bearing upon the boy's condition was concerned. An older brother is very bright. Birth was normal in every respect. He was nursed by his mother until the age of fourteen months. He seemed very bright during infancy and early childhood. His early development was normal. He has had pneumonia and afterward scarlet fever. Physical examination showed a boy of shy appearance in good physical condition. He had a slight degree of nasal obstruction on account of a small amount of adenoid tissue in the nasopharynx. He had no apparent errors of refraction. Was right-handed. He had a fair amount of general information, took part in the games of his companions, and was fairly intelligent in everything not connected with his school work. He was taking piano lessons and is making very good progress, as he reads notes with ease.

I found, however, that he could name correctly but a few of the letters of the alphabet; z he called s, l he could not name at all, r he called b, p he called r, t he called f, etc. He was unable to read the simplest words, calling "dog" you and "yes" our. "May," "did" and "on" he would not attempt. His recognition of numerals was good. He could do simple multiplication, addition and subtraction.

About half of the cases of word-blind children are also letter-blind, while but a small proportion are unable to recognize figures. In fact, some of them are unusually good at arithmetic, and the facility with which the case under discussion recognizes musical notes has been noticed in others. As I have remarked in the article alluded to, although but some 40 cases have been closely observed, it would appear that this number represents but a small proportion of those affected, and that systematic school inspection and closer study of backward children in the consulting room and the clinic will show that this is not at all a rare condition. Thomas⁴ calculates that 1 in 2,000 of all London elementary school children may be expected to show word-blindness to a considerable extent. It is of the utmost importance that these cases

be diagnosed and the proper educational treatment instituted while the child is still young enough to profit by it.

Figure-blindness, or Amblykusia.—A small proportion of patients subject to word-blindness will show figure-blindness to a greater or lesser degree, although some are exceptionally good at arithmetic. Congenital figure-blindness to any marked degree unassociated with word-blindness has not, I believe, been described, though in speaking of acquired aphasia Bastian⁵ says "on rare occasions it has been found that loss of ability to read and comprehend numerals exists in the absence of word-blindness." Taking these facts into consideration, it would seem that the visual impressions derived from numerals are registered in a brain region which is slightly removed from the visual word center. Children will be found who, while able to recognize the letters of the alphabet both singly and when combined to form words, are unable to recognize or remember numerals, especially when in combination. These children are very likely to be bright in subjects in which figures are not required, though, as in word-blindness, occasional cases will be found in which the lack of cerebral development is more or less uniform, but more marked in this particular direction.

These children usually fall far behind in their mathematics and are often kept back in their other classes because they are unable to learn enough arithmetic or algebra to admit of their promotion.

Congenital Word-deafness.—Of all the centers concerned in speech the integrity of the auditory is of the most importance.

Thought in its higher manifestations cannot be carried out without the aid of language of some kind. The most used and most important means of expression is through speech. The proper development of speech is dependent not only upon a perfect peripheral hearing apparatus (the ear), but also upon a perfect auditory center. Congenital deafness always entails mutism, as does acquired deafness occurring before the child has learned to talk. Even the child of five or six years who has learned to talk will, upon becoming deaf, forget how to speak. Under these conditions there is an arrest of development in the auditory center secondary to the peripheral lesion. In word-deafness the trouble lies in the auditory word-center, "the cortex of the middle and posterior portions of the first temporal convolution, extending over into the second temporal and upward into the supramarginal

convolution, where it impinges upon the cortical area for visual images.”⁶ In this condition words are heard merely as noise, or impressions only of certain sounds making up words may be received. In the first condition the child might be suspected of being feeble-minded, even though his general cerebral development in other directions might, except in so far as it is dependent upon this important center, be normal.

CASE II. Violet L., aged five. Referred by Dr. W. P. Barndollar on account of mutism. First examined April 11, 1910. Family history negative, except that maternal aunt died of tuberculosis. Is second child. Birth was normal. Is right-handed. Nothing unusual in early development. Child has never been ill. She had enlarged tonsils and adenoids, which were removed several months ago. She is a very healthy, alert looking child, with apparently normal mentality in every other direction with the exception of inability to talk. Dr. Barndollar states that she is not deaf for ordinary sounds. She, however, seems unable to understand anything that is said to her, although she is very expert at interpreting actions accompanying verbal directions or commands. She also seems to be able to use lip reading to some extent. Efforts at speech are confined to a few unintelligible sounds. Diagnosis was made of word-deafness with consequent mutism. An attempt will be made to educate the word-centers of the right hemisphere.

Idioglossia.—Of idioglossia, which I believe to be due to partial word-deafness, Bastian says:⁶ “Some curious cases of congenital speech defect were described by Hadden, to which the term ‘idioglossia’ has been applied. These children have, to a certain extent, a language of their own, so that when asked to repeat phrases they make use of different, though definite, sounds instead of those proper to the words that should be employed. The sounds which they substitute are said to be always the same for the same words. Some of these patients have been capable of writing correctly from dictation, and they have also shown a fair amount of general intelligence.”

Guthrie devotes an entire chapter to this subject in his book on “Functional Nervous Disorders in Childhood.”⁸ After reviewing the cases to be found in medical literature he reports in detail a number of cases which have come under his own observation, and draws the following conclusions:—

"(1) The term idioglossia is legitimate as representing the condition of a well-marked group of cases.

"(2) Idioglossia is neither a spontaneously invented language nor an example of atavism, nor a 'sport' in language. It is not to be confounded with baby language nor with the language of imbeciles, although it bears a superficial resemblance to them. It is not evidence of weakened intellect, but may possibly indicate hereditary taint of insanity.

"(3) Idioglossia is an exaggerated form of minor and extremely common defects in speech.

"Idioglossia does not depend upon malformation or imperfection of the motor organs of speech, but probably is chiefly due to congenital deficiency of audition not amounting to deafness.

"As such it has no more pathologic basis than has the absence of a liking for sport, or a taste for art, or a sense of humor."

This condition is by no means rare, and, as Guthrie states, "should not be confounded with baby language nor with the language of imbeciles."

Upon being confronted with a child with idioglossia the temptation would be to put it down at once as feeble-minded, especially when his speech defect is combined with a marked want of attention and mental concentration, as is often the case. These cases come very often under the observation of those who have much to do with feeble-minded and backward children, and it is of the utmost importance to the future of the child that a correct diagnosis be made. As Coleman says,⁸ "Although the children are often intelligent and quick, the difficulty of making themselves understood gives other people the impression that they are idiots." I will report a case that recently came under my own observation.

CASE III. T. F. T., male, aged five years. Referred by Dr. J. Homer McCready. First examined February 14, 1910. Family history negative, except that father drank excessively at times. Is the second of three children. Birth normal. Early development normal, except that no attempt was made to speak until the age of two years. He had measles and typhoid fever at four years, from both of which he made a good recovery. The child was robust and in good physical condition. The laryngologist who referred the case stated that the hearing was good and that the nose and throat were clear. Attention was wandering, but general intelligence seemed to be very good. Speech was unintelligible. He rendered "Go to bed," "do bei"; "piece of candy,"

"pe tandy"; at, ha; on, o; wax, wa; it, i; up, u; look, ook. With only a superficial examination I would have classed this boy as imbecile. His marked improvement both in speech and in attention and general intelligence under special training have led me to believe that that would have been a serious mistake.

Delay in Acquisition of Speech.—Occasionally children will be found whose later development is normal in every particular who do not speak until five or six years of age. When word-deafness can be eliminated the possibility of retarded development of the motor speech center or its association pathways (either functional or structural) should be considered. It might be well at this point to speak of the influence of right- and left-handedness (or, rather, right- and left-sidedness) upon the development of speech. It is not the purpose of this paper to enter into a discussion of the reason for the fact that in 91 per cent. of individuals the left side of the brain seems to be assuming control of the more complicated motor functions performed by the right side of the body, while the right hemisphere attends more especially to the nutritive functions through the sympathetic system.⁹

It is generally conceded that in right-handed individuals the complicated mechanism of speech is controlled by the zone of language in the left cerebral hemisphere.

"It must needs be admitted that there is a general auditory area, a general visual area, and a general kinesthetic area in the right hemisphere, and that incoming stimuli make on it an impression similar to that which they do on the so-called "educated" hemisphere. These impressions are bilateral in reception, but unilateral in interpretation. This unity of interpretation is determined by commissural fibers of the corpus callosum. Now the same factors that determine right-handedness determine also that the left hemisphere shall be the executive speech side, but the elementary work is done on both sides."¹⁰

An individual is congenitally either right- or left-sided, consequently the executive functions of his speech centers must assert themselves very early in his development, at the time when the only sounds he makes are purely reflex. General kinesthetic impressions have a decided influence in the development of the speech centers, as is shown by the marked improvement in speech shown by cerebral hemiplegics after tenotomy. The more frequent and dexterous use of the muscles of one side would, therefore, assist materially in speech development. It would seem ad-

visible in those children who use the left hand by preference to allow them to continue doing so until the full development of language in all its manifestations, including writing, instead of forcing the use of the right hand, as is usually done.

In support of this theory I will report the case of a little girl who recently came under my observation.

CASE IV. L. A. Referred by Dr. M. B. Katzenstein. First examined March 6, 1910. Family history negative, except that a maternal aunt died of tuberculosis. Birth normal in every detail. Child is well formed and healthy, has never been really ill. Development in everything except speech, normal. Did not attempt to form words until one and one-half years of age, when she began to acquire a vocabulary of a few words in the usual way. About this time it was noticed that the left hand was used in preference to the right. Steps were taken to correct this tendency, after which she suddenly ceased to talk. She used unintelligible phrases and gestures to denote her wishes. The child's mental condition was on a par with that of other children of the same age. Her appreciation of words and sounds was very good. Her articulatory organs showed nothing abnormal. After a week or two of special training with liberty to use the left hand freely she began to speak again at about the stage where she had left off.

Amusia and Ambly-musia.—If we accept the theory held by Edgren and others, that the different forms of amusia are dependent upon damage to special centers and commissures which are adjacent to, but not identical with, those damage to which gives rise to the corresponding forms of speech defect, we must assume that an auditory center for tones will correspond with the auditory word center, a kinesthetic tone center with the kinesthetic speech center and a visual center for notes with the visual word center. In a congenital lesion or variation in the auditory tone center there would be partial or complete tone-deafness. According to Bastian,¹¹ "The existence of tone-deafness as an isolated and inherent defect is probably far from rare." There are persons who are incapable of discriminating between the two notes of an octave and who, notwithstanding the most frequent opportunities of hearing music, remain quite incapable of distinguishing one tune from another.

Variations in the kinesthetic center or its commissures would account for the inability of some individuals to "carry a tune." There are some persons who, while possessing a "musical ear,"

are still unable to reproduce what they have heard. It is interesting to note in this connection that idioglossia is sometimes associated with ambly-amusia, as in the case of H. P., reported by Guthrie.⁸ It seems very likely that the imperfect appreciation of the various shades of difference in cadence and inflection of the normal voice might have a decided influence upon the causation of word-deafness.

Stuttering.—I fully agree with Claiborne⁹ that stuttering is due to a congenital defect, and believe that the variation is one of this class. The subject of the relation of stuttering to amusia I expect to take up in a later paper.

Congenital variations in the visual center for musical notes is difficult to demonstrate, though it sometimes occurs that those who have attempted to gain a musical education have found it very hard to read music. With the exception of the influence upon stuttering, of which I have spoken, the lack of development seems to bear no intimate relationship to retardation. Many men of great intellectual endowment have been totally destitute of the musical faculty, and it is, further, a well-known fact that in the feeble-minded it is often well developed.

Conclusions.—Clinical evidence would seem to warrant the assumption that:—

(1) There are a large number of children retarded in their mental development on account of insufficient activity caused by biological variations of the special centers making up the zone of language.

(2) That these children are very likely to be considered feeble-minded unless studied very carefully.

(3) That these children may eventually become feeble-minded by deprivation unless their condition is exactly recognized and the proper treatment instituted.

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SOME PROBLEMS OF NUTRITION IN EARLY LIFE.*

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PART II.

Up to this point we have considered the digestion of milk as a whole. We now come to an even more interesting line of investigation—the fate of the individual constituents of milk.

To observe an historical order, it is the proteids which have longest and most concerned the pediatrician. Upon casein in cow's milk has been laid the onus of bad results in artificial feeding ever since serious thought has been given to the question, and every effort has been made to administer casein of cow's milk qualitatively and quantitatively the same as woman's casein or to so change the casein physically as to prevent or modify the coagulation, or chemically, by predigestion, to make it more readily absorbed and utilized by the infant.

The idea that casein was the particular constituent of milk difficult of digestion seems to have persisted because of the appearance in the stools of artificially-fed children of so-called "casein curds," of which more anon.

Differences in the caseins of cow's and woman's milk may, indeed, exist, but they have not been sufficiently determined yet.†

The ability of the infant's digestion to handle cow's casein has been investigated under physiologic and pathologic conditions. Langstein has demonstrated that the stomach contents of infants show about the same amounts of peptones and albumoses after cow's milk and after woman's milk,‡ and Orgler, examining the stools of various infants who had been fed on cow's milk which contains very much nitrogen, and woman's milk which contains but little, found that the nitrogen in the stools on both feedings was the same. Meyer gave sick children woman's whey plus cow's casein and cow's fat, on which they thrived; on the

*The Jerome Cochran Lecture, read before the Medical Association of the State of Alabama, April 20, 1910.

†Orgler, "Der Eiweissstoffwechsel des Saeuglings," *Ergebnisse der Inneren Medizin und Kinderheilkunde, Zweiter Band*.

‡Quoted from Grosser, "Die Rolle des Eiweiss in der Sauglingsernahrung," *Muenchener Medizinische Wochenschrift*, September 28, 1909.

other hand, he gave them cow's whey plus woman's casein and woman's fat, on which they failed to thrive, from which he deduced that cow's casein cannot be the injurious factor in artificial feeding.*

From the pathologic side, from Finkelstein's clinic, where the effects of feeding of casein have been carefully observed, it is stated that neither rise of temperature, dyspeptic stools nor other untoward results have been seen after administering casein, and further that it was often possible to cure mild cases of digestive disturbances by giving large amounts of casein, and, finally, that even in the severest disturbances in nutrition, in "intoxication," large doses of casein were given without any bad effects†

All this and more, which I have not time to review here, justify Czerny and Keller in saying that it may be looked upon as certain that in the intestine of the healthy child, under the influence of the different digestive juices, cow's casein finds as favorable conditions for solution and absorption as woman's casein, and that both are almost completely broken down, and that under normal conditions at the most an insignificant residue escapes absorption.

To return to the "casein curds," let us see how far the supposition that these masses in the stools are really casein is justified.

This idea was fathered by Biedert, who drew this conclusion because of their gross appearance, because they gave the Millon and biuret reactions and because of their nitrogen content. It has been shown, however, that no such conclusions are warrantable on the gross appearance of the curd and that the proteid and nitrogen content are derived from the digestive juices and from desquamated epithelium.

The curds are really due to fats, fatty acids, bacteria and epithelium. The fact that the nitrogen content of the food and the nitrogen content of the stools have no relation to each other argues against the curd as undigested casein. These curds, too, appear when infants are on large amounts of sugars and also when fed on whey, which contains no casein and no fat. In this last condition the fats and fatty acids are attributed to the sugars and the nitrogen to the intestinal secretions.‡ The appearance of the "casein curds" do not point, then, to a proteid indigestion.

* Quoted from Grosser, *loc. cit.*

† Meyer and Leopold, "On So-Called 'Casein Masses' in Infants' Stools," *ARCHIVES OF PEDIATRICS*, October, 1909.

‡ Meyer and Leopold, *loc. cit.*

This new conception of the curd is a very important one, for it stays our constant interference with the casein in our formulas in the effort to banish the masses from the stools and directs our attention to two other substances looming large in our new views of food disturbances, fats and sugars.

If we accept this interpretation, it adds weight to the statement of Grosser and others that neither chemical nor experimental investigation afford us any ground whatsoever for the supposition that cow's casein acts injuriously. In fact, proteid, whether woman's or cow's, is now looked upon as the most innocent and easily handled of the food constituents.

Let us consider for a moment the functions of nitrogen and how they differ in the adult and in the child.

First, nitrogen repairs waste; makes good the daily wear and tear of the proteid constituents of the tissues, used up in the performance of their functions. Of course this is equally important to both child and adult, but in the latter it constitutes most of its utility, and in arranging the adult dietary the proteid need which shall subserve this function is alone imperative. In the adult Voit's standard, which is generally accepted, calls for 118 grams, though Chittenden's experiments contend for lesser amounts, ranging from 50 to 80 grams, and argue for advantages accruing to the organism from avoiding an excess.

In infants this minimum proteid need cannot be accurately determined, but in some experiments seems to run from 0.2 to 0.45 grams nitrogen during the first fourteen days of life. In an older child a nitrogen equilibrium was struck, when the child was furnished with sufficient calories from carbohydrates at 0.9 gram.

Second, nitrogen adds to the body substance. This deposit or storage of nitrogen plays a secondary rôle in adults, but in children is of prime importance.

In adults, under usual conditions, nitrogen is not stored. Any excess administered is split up, burnt and eliminated. Only in the hypertrophy of muscles put to special activities, in pregnancy, in convalescence from wasting diseases and after prolonged fasting does such a deposit obtain.

In infants and growing children a large part of the nitrogen ingested is added to the body bulk in response to the imperative demand of the impulse of growth. So insistent is this demand that an infant can store nitrogen even when the calories of the food are insufficient. This fact accounts for the common observa-

tion that a child will increase in length, though the gain in weight is not essential. In an adult a diet of insufficient caloric value leads to proteid loss.

Considering first the healthy breast-fed child, Orgler* states that in a series of experiments on healthy infants, ranging in age from four days to five months, it was found that the amount of nitrogen ingested during that period was about the same at all ages, but that the nitrogen in the urine and stools increased with age, *i.e.*, the amount of stored nitrogen diminished with advancing age.

Younger infants stored almost double the nitrogen of the older. Orgler's gathered statistics showed:—

	Up to Fourteen Days.	Two Months.	Five Months.
Storage	0.351	0.153	0.048
Utilization	78.3 per cent.	40.8 per cent.	23.1 per cent.

Figures are expressed in grams per kilo per day.

Nitrogen storage will be found to form a curve like that of the weight, growing flatter with advancing age.

In this class of children, then, the deposit of nitrogen depends largely on the age, though at a given age it has a certain dependence on the amount ingested.

When a breast-fed child is sick, its capacity to store nitrogen depends on the morbid condition; it is less, however, than that of the healthy child of corresponding age.

In convalescent children the nitrogen storage may be very great. Their growth is more intensive. They should be considered rather on the basis of younger children of the same stage of development.

Their deposit depends more on the size of the intake and less on the age than is the case with healthy children.

Even more interesting to us as pediatricians is the behavior of the child to artificial feeding.

A good deal has yet to be done to put our conclusions on a sure basis, but from the many experiments that have already been performed one may be reasonably sure that the following conclusions are correct; that in skillful artificial feeding there is the same storage of nitrogen as in natural feeding, and even the percentage of utilization comes within normal limits.

Again, the storage depends on the age and on the intake.

* Orgler, *loc. cit.*

Finally, even sick artificially-fed children show no difference from sick breast-fed children in their ability to store nitrogen.

There is, then, so far as one can draw conclusions from metabolism experiments, no difference between breast-fed and artificially-fed children, in their capacity to utilize and store nitrogen.

The third function of proteid is to furnish heat and energy to the body. The heat value of proteid is the same as that of the carbohydrates. Each gram of either substance when completely combusted gives rise to 4.1 calories.

It is not, however, a function for the performance of which the human body looks to proteid, but rather to fat and carbohydrates. Moreover, it is not an economical form of fuel when so used, as, owing to what is termed its "specific dynamic action," some 28.6 per cent. of its value is given off as free heat, leaving only 71.4 per cent. available for the purposes of cell life.

In infants this function of proteid plays a small part, especially in natural feeding.

In early life, then, proteid is used to repair waste, then to be stored to the limit of the storage capacity of the body, then to furnish energy and be eliminated in the urine.

The sparing of nitrogen built into the body and the storage of nitrogen brought to the body are greatly influenced by the constitution of the food as a whole, by the other constituents of the food. Indeed, the art of feeding in infancy and quite as much in morbid conditions in adult life, depend upon this appreciation of the effect of one food stuff upon another in the metabolism of each.

But, from its high caloric value, 9.3 per gram, one might anticipate would have a marked effect in sparing proteid, but such effect is hardly appreciable, while the influence of carbohydrates in this direction is enormous. Orgler explains that while nitrogen storage, which takes place in the presence of carbohydrates, is due in part to the fact that enough calories are added to meet the energy needs and so spare the proteid from being used for that purpose, that is not all; for in some cases a gain occurs when cereal soups are added which afford a very slight caloric intake. How these small quantities of cereal operate to spare proteid is not yet definitely settled, but it has been conjectured that fermentation processes set up by it or its salt content may be factors in the case.

Mineral salts must have a very decided influence on nitrogen storage, for there is a striking parallelism between nitrogen storage and ash storage, both in its totality and in that of certain individual salt constituents, as phosphorus.

It is not known exactly how nitrogen is stored, but most of it probably as body substance, or it may be retained as polypeptids or some more simple substance, to be changed into body proteid as the occasion requires.

As the fear of proteid as an injurious agent in infant feeding has waned, the concern over fat as the disturbing factor in milk has increased.

We have seen how even in the newborn provision has been made for the proper digestion of fat. We now wish to consider a few facts about its metabolism and the differences it shows in the two milks we have under consideration, cow's and woman's.

Freund* emphasizes the necessity for a careful study of the fats when he expresses the well known facts that, while a breast-fed child thrives on a greater per cent. of fat than at any other period of life, an artificially-fed child rarely stands such amounts and a sick child can be seriously damaged by the smallest quantities of fat.

Mention has already been made of the work of Schwartz and of Meyer and Leopold on the physical differences in the fats of the two milks, and suggestions have also been made that there may be stereochemical differences as well.

Other differences lay in the higher content of oleic acid in woman's milk, in the lesser amounts of volatile acids, in the lower melting point of the fatty acids of woman's milk (38° - 39° C.) (cow's 40° - 41° C.), the higher iodine combining power 30-50 per cent. (cow's 20-30 per cent.)

The action of fat to delay gastric digestion, to be the last of the constituents of milk to leave the stomach, has been touched upon, and under pathologic conditions, such as pylorospasm, a true stagnation of fat in the stomach may occur; Tobler having been able to recover 29 grams of fat from the stomach in one case, more than the total ingestion of fat for the preceding twenty-four hours.

The interesting observation that has been made on the adult and on the dog that after a large oil meal the duodenal contents

* Freund, "Physiologie und Pathologie des Fettstoffwechsels im Kindesalter," *Ergebnisse der Inneren Medizin und Kinderheilkunde*, Dritter Band.

regurgitate into the stomach has not been demonstrated in the infant, and Freund, in the light of Pawlow's view of the tryptic origin of ulcer, correlates this with the absence of gastric ulcer in the infant in whom the duodenal ulcer is observed.

It is generally accepted that fats are not absorbed in a neutral form, but whether as fatty acids or soaps is a question. They are nearly all taken up from the small intestine.

In healthy breast-fed children 94-98 per cent. of the fat is absorbed. In the artificially-fed the absorption is remarkably good and not bad in the chronic diseases, but in the acute attacks and especially in alimentary intoxication the absorption was more or less seriously interfered with.

When we have to deal with fat intolerance our efforts at present are largely in making quantitative changes in the fats, but how crude these methods really are one appreciates when he considers the differences just referred to and also the great gaps in our knowledge as to its further changes, gaps in which the disturbance of many factors may take place. For example, we do not know how much fat goes by the lymphatics and how much by the blood; we do not know what changes the fat into an invisible soluble form in the blood; how it passes out of the blood or how it is stored in the fat depots.

One phenomenon closely related to fat metabolism which occurs in certain forms of disturbed alimentation is acidosis, the circulation in the blood and the appearance in the urine of acetone, diacetic acid and oxybutyric acid. Indeed, the vomiting, stupor and other symptoms due to its toxic effects may predominate the picture.

Briefly, the condition may be defined as the results of an incomplete oxidation of fats in the presence of insufficient carbohydrate or disturbed carbohydrate metabolism.

To me these acidoses form one of the most interesting chapters in nutritional disturbances in childhood. Not only do they occur frequently in infants on an exclusive milk diet, but I have seen several in older children, who, on an otherwise rational dietary, had been taking perhaps a quart of milk daily all their lives. They are interpreted as having chronic intestinal dyspepsia; one I saw diagnosed as tuberculosis; in a more acute case in a child of three years as a tuberculous meningitis. I saw 3 fatal cases in one year, and although the physicians in charge had ap-

preciated the condition every effort at relief was futile. Two of these were in older children.

Salts play a part in the vicious circle of events leading up to this acidosis and we shall speak presently of the part they play in metabolism.

How groping our efforts are even at the present time in the modification of milk is borne in upon us when we take into consideration the significance in life's processes of certain constituents of milk, the salts, the proper proportionment of which in artificial feeding has scarcely won an effort.

Woman's milk contains 0.2 per cent. of salts. Cow's milk 0.78 per cent. These, of course, are averages.

But not only does the total quantity of salts vary, but the percentages of the individual constituents vary, and this, when one considers on what niceties of proportions of one salt to another certain biological functions depend, as the work of Jacques Loeb has brought out, is of great significance.

It is not merely the salt as a whole that plays a part in the physiology of nutrition, but those parts of the molecule, which dissociated and bearing their positive or negative electric charges, of greater or lesser magnitude depending on the valency, we call ions.

Certain ions act as catalysers as Fe in oxidation and Mg in chlorophyl of plants in the assimilation of CO_2 .

It would take me too far afield to detail what we know of the part played by salts in biological processes, and, indeed, it is believed, to quote a remark of Jacques Loeb cited by Meyer in an exceedingly interesting article on this question,* that "there is scarcely a vital phenomenon which is not influenced by salts or their ions."

We know that the entire withdrawal of salts results in death and that even the withdrawal of a single salt leads to the same issue. On the other hand too much of any salt is injurious.

Taken as a whole, the utilization of the salts of mother's milk is much better than those of cow's milk. It has been shown that from woman's milk some 80 per cent. are absorbed and 40-50 per cent. are retained; while from cow's milk about 60 per cent. are absorbed and 15 per cent. retained.

This does not mean that the child does not get enough salts

* Meyer, "Die Bedeutung der Mineralsalze bei den Ernährungsstörungen des Säuglings," *Jahrbuch für Kinderheilkunde*, 71. band, I. heft.

from cow's milk; on the contrary, it absorbs actually more, but relatively less, and this excess of salts is not needed by the body.

Interesting experiments have shown that, as I have mentioned, a child fed on the whey of mother's milk and the casein and fat of cow's milk will thrive, while if the child is fed on the whey of cow's milk and the casein and fat of mother's milk it will not thrive. This was attributed by Pfaundler to a certain biological stamp set upon the albumin of the whey that suited it to its own species, but is much more attributable to the proper relations that exist between the salts.

Sufficient and insufficient salt administration with the food affect the weight curve in such a way that it makes it clear that they stand in intimate relation to each other.

What an important share they take in the new conceptions of food disturbances, as advocated by Finkelstein, will come out later.

If the scientific work done on the problems of nutrition in childhood, of which I have given but the most meager summary, plead for our attention, it is because they have a practical application to our daily work among children.

Most of my remarks upon this practical side will be directed to artificial feeding with cow's milk. They will bear upon the modification of cow's milk, the quantities to be given, the intervals of feeding, the energy needs and the proteid needs.

When we have thought of food needs in infancy we have been accustomed longest to consider actual quantity or bulk, later of the percentages of constituents or quality, and latest and least of the real body demands.

The amount of proteid ingested by the nursing infant is remarkably constant. Studies on infants from the age of fourteen days to twenty weeks have shown an intake of proteid varying from 7 to 9 grams, and as high in the second week as in the later weeks.

It has been mentioned that in the earlier weeks the greater part goes to storage and the lesser part to wear and tear, while with advancing age there is less storage and more repair.

The figure that is usually given for the proteid need is that about 7 per cent. of the caloric needs should be met by the proteid. *e.g.*, if we took the caloric needs of a child of 11 pounds or 5 kilos at three months as 100 calories per kilo or 500 calories, 35 calories should be covered by proteid. Taking 4.1 calories per

gram, as our divisor, we should have about 8.5 grams of proteid as our necessary quantity.

These figures are given, however, for breast-fed children, and although in the most successful artificial feeding the utilization of nitrogen may fall within the normal limits, this is not the rule, and we may consider that somewhat more proteid is needed under these conditions. That this is not strikingly greater is shown by empirical results. Taking from the last edition of Holt on "Diseases of Infancy and Childhood," the average milk intake for a child of three months, we find about 32 ounces of a milk containing 1.25 per cent. proteid advised. That means 12.5 grams. Analyzing Holt's tables still farther and comparing them with the theoretical demands, we find the differences still smaller in many instances, and, in fact, the approximation of theoretical needs and empirical instruction is really remarkable.

It is well known to us all that the human body is like a steam engine, in that it converts fuel fed to it into energy and heat; that the amount of work to be done determines the amount of fuel to be used. The human engine, however, may not cease work and there are certain minimal demands of fuel to be met that it may continue. This engine is unique, since, if the minimal demand is not met, it utilizes its own substance for fuel, at a sacrifice of its strength and integrity, of course, up to the point of exhaustion.

To-day food values are estimated in terms of their heat production, using as a unit the "calory," that amount of heat necessary to raise 1 c.c. of water through 1°C.

Rubner's estimation of the heat values of the different kinds of food stuffs have been accepted as standards. They are for

1 gram of fat.....	9.3 calories
1 " " carbohydrate	4.1 "
1 " " proteid	4.1 "

As the food given in infancy consists largely of milk and of a few other simple food stuffs, it would seem a very easy matter to estimate the caloric value of an infant's dietary.

I wish in this address to enter a very special plea for the routine determination of the fuel value of the daily dietary.

While urging this measure I am keenly cognizant of its limitations; that the child is far from being a mathematical problem; that individual children vary in their powers of assimilation, in

their growth intensity; that the utilization of a given food stuff depends on the composition of the food as a whole; its suitability; and finally, that entire agreements as to energy needs does not yet obtain.

However, if we have an appreciation of approximate requirements, we may save ourselves from ridiculous deviations from them, which are frequent enough when they are not kept in mind. Heubner has established what he calls his "energy-quotient," *i.e.*, calories per kilo of body weight per day, at six months as 100. This figure worked out from observations on quantities taken by thriving children, agrees remarkably with the results obtained in the study of the quotient in breast-fed children.

We may take these figures as average demands: for the first quarter year 110 calories per kilo; during the second quarter 100 calories per kilo, and during the third quarter as 90 calories per kilo. These figures gradually decrease, but stand as high as 75 and 80 calories per kilo at the end of the second year.

With reference to this problem let us take a child of six months weighing 16 pounds, or 7.25 kilos. His caloric need would be about 725. If he was given six feedings of 8 ounces each, or 48 ounces, of a milk diluted one-half, as so frequently is done, he would get about 500 calories, an amount frankly insufficient. If, however, 5 per cent. of sugar was added to this diluted milk he would get about 780 calories, about his need.

One will find advised a mixture of 4 per cent. fat, 7 per cent. sugar and 2 per cent. proteid, in amounts of 48 ounces daily for this child. This amounts to 1,048 calories, or more than enough for a child of 20 pounds, and such a food long continued can well lead to a food disturbance.

Let us suppose that this last formula was given in six feedings of 6 ounces each, or 36 ounces.

Then the calories would amount to 786, just about the theoretical needs. Finally, suppose that a change in stools is interpreted as a fat intolerance and the milk is skimmed; the formula will be deprived of 3.5 per cent. fat, or 342 calories. It is a common thing for a child to be left on these fat-poor formulas, as if the quantity of milk was alone to be considered, and not the quality.

As we are accustomed to use ounces instead of c.c. or grams, one may reduce the caloric values to ounces. Taking 31 grams to the ounce we should have for 1 ounce of fat 31×9.3 , or

about 290 calories per ounce; for carbohydrates and proteids, 31×4.1 , or 127 calories per ounce.

Suppose we wish to estimate the caloric value of 1 quart of a milk mixture of a formula of 3 per cent. fat, 6 per cent. sugar, and 1 per cent. proteid given to a child of two months weighing 10 pounds.

$32 \times .03 = 1$ ounce fat, or 290 calories. As the sugar and proteid have the same value we add and multiply $32 \times .07 = 2.25$ ounces. This multiplied by 127 = 286 calories. The total being 576 calories, just about the child's needs, taken at 110 calories per kilo, or 50 per pound.

The intervals of feeding are a matter of importance. I am convinced that failure in artificial feeding may often be attributed to following the traditional frequency of feeding.

It will be recalled that while the stomach will be found empty one and a half to two hours after a feeding of mother's milk, it requires three hours to complete the digestion of a meal of cow's milk.

Appreciating this fact, it is obvious to us that intervals of less than three hours never permit the stomach to empty itself, and that, owing to the layer-like arrangement of the food and digestion at the periphery, the nucleus of the curd may have been in the stomach for hours, increasing its content of bacteria and fatty acids. Even intervals of three hours allow of no period of rest to the stomach and it has been shown that when the digestion has been completed there is a secretion of alkaline mucus into the stomach, a completion of its toilet, so to speak, and then a rest.

This period of rest should be respected if possible.

The above figures are average figures for suitable foods, but, as has been said, the stomach disposes of the various constituents of the food at different rates; the carbohydrates passing first, the proteids requiring about twice as long, and the fats a still longer period.

It has been demonstrated that the raising of fat from 3 per cent. to 6 per cent. will lengthen the time demanded to empty the stomach from 100 minutes to 210 minutes, that is, more than double the period of gastric digestion. This retarding action of the fat upon digestion is due, in the first place, to the fact that fat delays the secretion of gastric juice; hence the acidity needed to open the pyloric valve, and again to the fact that fat in the

duodenum further operates to keep the valve closed. Not only this, but the dilution determines to a degree the length of digestion; any deviation from the optimum 50 per cent. dilution mentioned delaying it. Thus it will be seen that the length of time a meal remains in the stomach depends much upon the quality of the meal.

Another matter of significance in the success of infant feeding are the quantities to be given at a single meal.

The figures usually found in the text-books for gastric capacity are based on anatomical measurements and do not represent the physiologic capacity, that is, the amount of milk an infant may take at a single feeding. This amount is considerably greater than the anatomical measurements would seem to warrant. The reason for this was brought out in the explanation of the separation during the meal of the solid from the fluid portion of the milk and the passage of the latter into the duodenum, which begins at once.

The question of physiologic capacity has been excellently discussed in a recent article by Mosenthal, of New York.*

Utilizing the data from Mosenthal's tables compiled from figures derived from Pfaundler and from Caemerer, we find advised during the first two months seven feedings a day at three hour intervals, and during the next three months six feedings at four hour intervals. The amounts recommended at a single meal are:—

First	month	115	c.c., a scant	4	ounces
Second	"	125	" " trifle more than	4	ounces
Third	"	145	" " " less	5	"
Fourth	"	145	" " " " " "		
Fifth	"	170	" " " " " "	6	"

These figures represent physiologic capacity, and in the first and second months are about 25 per cent. more than the anatomic capacity, in the third month between 20 per cent. and 25 per cent. more, in the fourth month between 15 per cent. and 20 per cent. more, and in the fifth month about 20 per cent. more.

Czerny and Keller call attention to the fact that a breast-fed child left to its own inclinations feeds five or six times a day, rarely seven.

* Mosenthal, "Gastric Capacity of Infants," ARCHIVES OF PEDIATRICS, October, 1908.

They fix upon five meals a day as the optimum, at four hour intervals; four in the day and one at night, both for breast- and artificially-fed children.

With reference to quantity, they say that in the first weeks a breast-fed child will take about one-fifth its body weight in milk; from the middle of the first quarter year to the middle of the second quarter year one-sixth to one-seventh its weight; at the end of the first half year one-eighth.

To children in the first four weeks they give 100 c.c. ($3\frac{1}{2}$ ounces) in a bottle; to older children 200 c.c., and to strong children after nine months 250 c.c. They never give more than 1 quart of fluid in twenty-four hours, adding other food when this amount of milk mixture is insufficient.

If at any feeding the child seems satisfied before the amount is exhausted he should not be urged to finish the prescribed quantity, but the bottle should be removed at once.

What, now, is the best food for the nursing infant? It should go without saying, mother's milk; and yet this obvious fact is so little considered that thousands of infants are put on cow's milk because of trivial objections on the part of the mother to nursing her child or because some difficulties arise in establishing the milk supply or little disturbances in the course of nursing are magnified and misinterpreted.

We should remember that a milk very slow in coming in may eventually flow in abundance and that too hasty substituting of cow's milk, in the fear of inanition during this period, may initiate digestive disturbances that will haunt the whole nursing period.

Mother's milk during the first few weeks is of importance to the success of artificial feeding, if we are finally driven to it, out of all proportion to its food value. The best authorities plead for even a week of mother's milk. Just what this brief period of breast feeding does of such importance is not clear, but it has been suggested that perhaps it establishes a physiologic flora in the intestinal canal.

If digestive disturbances occur on a cow's milk in the first two weeks the feeding problem will be a very difficult one or quite impossible on artificial feeding, and recourse to a wet nurse should be had at once.

Breast feeding should be continued throughout nine months if possible; if not, as long as possible.

If the mother's milk proves insufficient have recourse to mixed feeding. There is nothing more astonishing than the assistance to digestion of and assimilation of cow's milk that a very minute amount of mother's milk or woman's milk will afford.

If the child must be put on artificial feeding let it be cow's milk. The great sin of artificial feeding throughout this land to-day is ignorance of the proper use of cow's milk and the ready acceptance of the proprietary foods as substitutes.

The last two decades has seen the rise of modified milk. It has subserved a very useful purpose in demanding more intelligent supervision of what is given the infant; it has permitted us to appreciate more fully what constituents of food are at fault when the food disagrees; but it has come far from solving the problem of infant feeding. It has been a step in the evolution of the science of feeding, but not a final step.

Thousands of men, to whom its logic has appealed, have been appalled at what has seemed its intricacies, at the details of its technic.

The use of creams of different degrees of richness, the insistence on small fractions in percentage, have often bred fear rather than confidence.

If cow's milk is to be used at all its use must be reduced to a simplicity.

I believe that the vast majority of children can be successfully fed on dilutions of whole milk without the aid of creams.

Although my paper is already so long that I cannot take up this matter at any length, nevertheless I feel that my mission here today is largely to encourage the use of cow's milk in such simple dilutions that every man may feel that it is an instrument ready to his hand.

I will give, then, a brief summary of the uses of dilution of whole milk in the Breslau clinic,* one of the best in the world, to fortify my contention.

This clinic begins with a dilution of one part of milk to two of water, adding 4 per cent. of milk sugar and increasing the strength of the milk up to whole milk at the end of the year.

The whole milk at the end of six months does not represent more than $\frac{1}{2}$ liter (1 pint) of milk, and if gain of weight does not obtain on this starch foods are added. One liter, at the end

* Czerny-Keller, *loc. cit.*

of a year, with the additional cereals, is considered enough for a well developed child, and more than this is advised against.

As a diluent they use in the first three months what they call "schleim," a decoction of the whole or coarsely broken grain of barley, oats or other cereal, which contains vegetable proteid, but little starch. This is prepared by adding water to these cereal grains and slowly cooking or simmering, allowing the grains to settle and pouring off the supernatant fluid, which is the decoction desired.

Such thin cereal waters are made thicker in the second three months.

At six months starch is added in the shape of the cereal flours, prepared as we are accustomed to in this country. At this period, too, the meat broths are begun and the cereal is often added to this, the whole constituting a meal, while the total amount of milk is divided among the other four feedings.

The mixture is not changed as long as the child is gaining weight, merely because the child is older, as is so often done when rules laid down in text-books are rigidly adhered to, with the result of overfeeding, but when there is a pause in weight. More urgent indications for an increase in food are the scantier urine, the browner small stool and the loss of tone in tissues.

When on such a diet as has been described, suitable to the age and weight, a gain does not obtain, sometimes a change from milk sugar to cane or malt sugar will effect it, and this is preferable to raising the milk sugar to get the result. We have the statement of Czerny and Keller that milk sugar does not have the same influence on weight as the other sugars, as cane or malt, or even the cereal flours.

To prevent overfeeding is as important as to avoid underfeeding and the results much more difficult to overcome.

The Breslau clinic insist on careful observation of the stools, which on suitable amounts of milk are yellow and soft and which as soon as the food is pushed too far become lighter yellow, then gray, then white, and may be easily wiped from the diaper, leaving scarcely a stain.

My own feeling is that in the earlier months, if such mixtures seem insufficient, a small amount of cream may be added, as it seems to be a fact that fat is better borne in the earlier months than later. Fats, too, are better borne in the presence of low sugars than high.

One ounce of gravity cream (16 per cent.) in a pint adds 1 per cent. to the fat, and this amount, or a portion of it, might well be added.

I would advise, then, that we begin with whole milk diluted, one part of milk to two of water, with 4 per cent. sugar, later 5 per cent. If this is insufficient add the cream as just mentioned.

That we give five feedings at four hour intervals; if this is insufficient six at three and one-half hour intervals; for the rest following the lines previously laid down.

(Continued in August number.)

THE EDUCATION OF DEFECTIVES.—Decroly (*La Policlin.*, March, April, 1909) advocates the education of defectives along manual lines, which will develop the superabundant energies of the child who lacks the possibility of intellectual development so as to make him a producer and a useful member of the community. The physician can educate the parents in personal and family hygiene, can assist in preventing the birth of defectives by advising as to marriage of persons having hereditary diseases, and can aid in improving the hygienic conditions under which the poor live. They can be taught a rational physiology and a knowledge of the intellectual and moral deficiencies of children, and how to treat them. The physician can help in developing the school system and the medical inspection of schools. Manual schools and farm schools should be established, where the teachers can individualize the children, and develop the capabilities that are found to exist in even the most defective child. Such schools, as well as those for the blind and the deaf and dumb, should be maintained by the State at the public expense. The services of the physician can be of the greatest value on the boards of management of such schools, and as examiners for entrance to them, as well as in supervising the instruction. Physicians should exert all their influence to obtain legislation to this end, and to assist in the education of the public on this subject. Another branch of useful work is in the direction of preventing the sentencing to prison of children under sixteen years of age, the establishment of children's courts, and of clinics for the treatment and instruction of children in connection with public schools.—*American Journal of Obstetrics.*

CLINICAL MEMORANDA.

RETAINED INTUBATION TUBE (SECOND INTUBATION). DIPHTHERITIC PARALYSIS. RECOVERY.*

BY W. P. NORTHRUP, M.D.,
New York.

Presbyterian Hospital service, ambulance admission, great urgency. W. K., fifteen months old, left Willard Parker Hospital four weeks before this history begins. He had been in that institution four weeks suffering from diphtheritic laryngeal stenosis and wearing an intubation tube two of those weeks. He had had whooping-cough four months before contracting diphtheria. Since leaving Willard Parker Hospital he had been well, except for a cough. Three days before entrance he began to be "croupy." This was four months after whooping-cough and two months after beginning diphtheria. He was better the day following, of croup, worse again the succeeding night and was "bad all night." The next day he had no relief. All day he grew worse, till late in the evening the mother thought he was about to choke to death; indeed, she thought him dead for a few moments.

He came into hospital in such urgent dyspnea that immediate intubation was attempted by the ambulance surgeon. Insertion of the tube was very difficult and at first attempt unsuccessful. However, the unsuccessful efforts at intubation resulted in temporary relief.

My first attempt at intubation was not successful. The tube met with obstinate resistance below the cricoid ring (subglottic edema or swelling). The very smallest tube was gently forced past the obstruction and relief afforded. So great was the dyspnea, so great the exhaustion from the repeated attempts to insert the tube, that artificial respiration was immediately necessary.

The first diagnosis was catarrhal laryngitis in a larynx recently injured by diphtheria and intubation, a marked nervous element being added from a recent whooping-cough. There was no pseudomembrane visible, tonsils were large, coarse râles were to be heard everywhere over both lungs, and the child was in a poor general condition.

Two days after admission respiration through the tube was free. Pulse, 180-190; temperature, 102°, 104°, 105.4° F., and for nine days thereafter the temperature ranged between 102°-

* Read before the Twenty-second Annual Meeting of the American Pediatric Society, Washington, May 1, 1910.

103° F.; after that it sank to normal and so continued. During the elevation of temperature signs of consolidation appeared at one apex and the gloomy prognosis of "the usual" ending was entertained. No diphtheria bacilli found in throat cultures.

After three days the tube was taken out, we still believing it to be catarrhal and mainly spasmodic. To insure quiet and to allay spasm the child was placed in a far corner of the ward, face to the wall, attended by a nurse familiar to its sight, and in addition given a fair dose of paregoric and ipecac. After a brief sleep it awoke, seemed frightened, choked up and ceased to breathe. With the greatest difficulty the tube was reinserted, artificial respiration was performed and the child given one more chance for life. If it had not been surrounded by all the necessities and even the luxuries of emergency resources it would have died then and there. In fact, this quick emergency relief was required a half dozen times in the next few days.

During the first month in hospital he proceeded to cough out all the tubes that could be put into him. Sometimes he would cough it out before the doctor could get out of the ward. More commonly he coughed it out just after the doctor had comfortably dozed off into his interrupted sleep again. It is estimated that he required intubation forty times during his stay in the hospital. Ever increasing sizes of intubation tubes were required until this fifteen-months child was requiring a tube proper for a five-year-old child. After four weeks in hospital he was able to go twenty-four hours without the tube for the first time. Two weeks later he again went twenty-four hours without it. Just seven weeks after entrance he went without the tube six and one-half days, again requiring it. In the effort to quiet spasm, for that seemed the greater part of the difficulty, he was given paregoric, ipecac and, what was a potent element, he was petted and soothed to do away with panic. He was frightened. For days and nights the nurses, and often the doctors, carried the little patient on their shoulders, his nose buried in their necks. Everybody became interested in his recovery and willing to do anything to further it. I mention this as an important and successful part of the treatment, and an element which was often mentioned by O'Dwyer. This was practically the last needed intubation. Duration of necessary intubation, seven weeks.

Five weeks after admission the temperature rose to 103.5°F., 102°F., 101°F., etc. This time it was presumed that he had pneu-

monia and perhaps that was the kindest thing that could happen to him. Our minds were filled with remembrances of past experience and the thought that he was to wear the tube for an indefinite period and that sooner or later he would require an operation on the larynx, after which he would succumb to pneumonia.

Fortunately, he now entered upon an unbroken convalescence, but with ever threatening recurrence of stridulous respiration and nervous dyspnea, many times narrowly escaping reintubation.

The patient was discharged from hospital, and later returned by the mother, claiming that he was very dyspneic again. It is not sure that she did not wish him to again profit by the advantages of good food and care and wished to board him with us. However, the little patient had been the subject of so much care and of so much solicitude that he had won his way to the hearts of those in the care of the ward and was kept willingly. He is there to-day. The nervous element is even yet very pronounced. The least excitement puts him into stridulous respiration, till he can be heard about the ward plainly. Even the excitement of his tray of food coming into the ward starts him into stridor. He has afforded us ample opportunity to study his case fully. Among other things, his voice is coming to him. He is not old enough to talk, but he is able to phonate, speaking a word or two. His pharynx looks healthy; we can see the epiglottis and top of his larynx, but not the cords. The case is now complete. We believe him to be well.

Résumé.—When thirteen and one-half months old patient wore an intubation tube in Willard Parker Hospital for laryngeal diphtheria. Recovered and was discharged "cured." Was at home four weeks, came to Presbyterian Hospital when fifteen months old in urgent dyspnea, reintubated repeatedly with ever-increasing sizes of tubes for seven weeks; complete recovery. Secondary dyspnea would seem to have been due to diphtheritic laryngeal paralysis, plus subglottic swelling, also complicated with a marked nervous spasm, the tendency to which was largely contributed by his previous whooping-cough. It is hardly proper to call this retained intubation tube. It is rather reintubation for late paralysis. The difficulty in settling the tube into place in the first intubation was due to subglottic swelling; the ever-increasing size of required tube was due to adductor paralysis; the inability to breathe when the tube was out was due to abductor

paralysis. When the paralysis passed away in the course of time the functions of the intrinsic laryngeal muscles were restored and the patient recovered naturally.

In volume IX. of this society may be found O'Dwyer's last communication before this gathering, entitled "Retained Intubation Tubes." He says: "The cause of persistent stenosis following intubation in laryngeal diphtheria can be summed up in the single word traumatism. Paralysis of the vocal cords may possibly furnish an occasional exception to this rule." Again, "Paralysis of the vocal cords as a cause of retained intubation tubes I confess I know little about." Also, "Paralysis of the intrinsic muscles of the larynx is acknowledged to be a rare sequel of diphtheria. I have never observed it." O'Dwyer, later in his paper, uses the expression: "In adductor paralysis, in which the retaining power of the vocal cords is lost," etc. Obviously O'Dwyer thought only traumatism was to be blamed and that due to faulty tubes and faulty methods of intubation. The present case is unique in my experience and reading.

EFFECTS OF SCHOOL LIFE UPON THE VISION OF THE CHILD.—N. B. Harman (*Proc. Roy. Soc. Med.*, May, 1909) has examined the reports of the examination of the eyes of 1,100 children. These show that by far the greater proportion of the cases of bad vision are due to natural conditions of the eye—that is, hypermetropia and hypermetropic astigmatism. These are congenital conditions, and there is reason to believe that they are the normal conditions of human eyes. Newborn infants are always hypermetropic; and it has been stated that it is the usual condition with the eyes of savage races. Myopia and its associated astigmatisms form between a quarter and a third of the whole of the cases; and since these represent less than one-tenth of the school population, it follows that under 3 per cent. of the children suffer from these defects. The differences in the vision of the boys and the girls, and of the natives and aliens, point to the necessity for the removal of those social conditions which are responsible, and in particular suggest a reduction of fine work in schools, the increase of air, light and space both at school and at home, and also a more generous and equal distribution of open spaces and playgrounds. The evidence of the deterioration of astigmatic eyes indicates the desirability of a special oversight of these cases.—*American Journal of Obstetrics.*

EDITORIAL.

THE DEATH OF DR. GEORGE CARPENTER.

Pediatrists of Great Britain and of the United States and Canada have heard with profound regret of the death of Dr. George Carpenter from cerebral hemorrhage on March 27th. At the early age of fifty years death came suddenly; for, on the day before, he had been in his usual good spirits. He recognized the nature and seriousness of his trouble, and after a brief period of unconsciousness passed away.

Dr. Carpenter has been best known to the English-speaking world as the founder and editor of the *British Journal of Children's Diseases*. He had long believed that Great Britain should have a journal devoted entirely to this branch of medicine, and had thought as early as 1896 that an Anglo-American journal would be supported in Great Britain. After a few years it was seen, however, that the time was not right; but in 1904 he considered that the psychologic moment had arrived, and the *British Journal of Children's Diseases* was inaugurated. The journal at once took its place in pediatric literature of the world, and has been, and is, of the greatest value in developing the special study of children's diseases in the British Empire. The loss to the journal by his death is incalculable, but Dr. Carpenter's enthusiasm and energy have placed the journal in a position of gratifying security and influence. We would extend to our British contemporary our sincere sympathy.

Dr. Carpenter was the son of a physician and pursued his medical studies at St. Thomas's and Guy's Hospitals. His first connection with the children's service was at the Evelina Hospital, and later he was physician in Queens Hospital for Children and to the Northeastern Hospital for Sick Children. His interest in, and enthusiasm for, pediatrics led him to take an active part in the formation of the Society for the Study of Diseases in Children, founded in 1900. He was the editor of the eight volumes of the reports of the Society, and, as has well been said, these admirable volumes will remain a lasting monument to his memory. At the time when the Society for the Study of Disease in Chil-

dren was incorporated into the Royal Society of Medicine, in 1908, Dr. Carpenter held the office of President of the Council for the new section. He was a frequent contributor to the medical journals, and among his published papers may be mentioned the following:—

“Congenital Syphilis in Children in Everyday Practice”; “The Differential Diagnosis of Abdominal Diseases in Children”; “Tuberculosis of the Choroid”; “Acute Pleurisy with Effusion”; “Cases of Uncomplicated Myocarditis in Children”; “On the Rearing of Children”; “Congenital Hypertrophic Stenosis of the Pylorus and Its Treatment.” His earliest paper dealt with the incubation period of German measles, and his last important contribution was the Whitman Lecture of 1909, on “Congenital Heart Disease.”

It is the testimony of his friends that the salient features of his character were his enthusiasm and energy and his scrupulous attention to detail. One of his friends writes that he cannot recall a single instance of a patient examined by Dr. Carpenter in whom a lesion had been overlooked, to be discovered subsequently by another observer. He was accustomed to take copious notes of observations and the results of examination at the patient's bedside, and as a result he became a clinician of the first order. His life and example are a valuable asset to pediatrics in Great Britain and America.

AMERICAN ASSOCIATION FOR STUDY AND PREVENTION OF INFANT MORTALITY.

Prevention of disease and evil conditions and betterment of existing states of health and environment are aims of all earnest practitioners of medicine. The leaflet of the American Association for Study and Prevention of Infant Mortality, recently issued, contains so much of importance on these subjects that we have quoted largely from it below, and recommend to the careful consideration of our readers its prospectus and its purpose.

One of the results of the Conference on Prevention of Infant Mortality, held in New Haven last November by the American Academy of Medicine, was the organization, at the close of that meeting, of the American Association for Study and Prevention of Infant Mortality, whose annual meeting will take place in Baltimore, November 9-11, 1910.

On January 1, 1910, the Association opened an office in Balti-

more, from which the work of the society has since been directed.

The objects of the Association are :—

- (1) The study of infant mortality in all its relations.
- (2) The dissemination of knowledge concerning the causes and prevention of infant mortality.
- (3) The encouragement of methods for the prevention of infant mortality.

Men and women who have attempted a solution of the problem, from either the medical or the sociological standpoint, have proved that the infantile death rate can be cut down at least one-half by the application of carefully considered preventive measures. As a result of the work of these pioneers the appalling waste of infant life is no longer regarded as one of the unalterable dispensations of Providence. The blame has shifted to society, and to social conditions—ignorance, indifference to the laws of health, industrial conditions, overwork, impure milk, overcrowding and bad housing.

In every part of this country—in fact, throughout the civilized world—the baby is recognized as one of the most valuable national assets. A sense of obligation to the child, as the citizen of the future, is awakening. In response to it, preventive undertakings are springing up on every hand, which aim not only to keep the baby alive, but to improve his chance to grow up to healthy maturity. Realizing that the problem is too complex to be solved by one set of workers or students, physicians and social workers have joined in a concerted effort to put the gospel of prevention to practical, every-day use.

The aim of this Association is to quicken the sense of responsibility already aroused, and to stimulate definite plans of prevention. Membership is open to all who are interested in the baby. It is not limited to physicians, investigators, nurses, social workers or associations which deal directly with the problem; but it is hoped that the fathers and mothers of the children who are getting a square deal will consider it a privilege to further the cause of less fortunate children.

The first annual meeting of the Association will be held in Baltimore November 9th-11th. The provisional programmes of the sessions and the list of officers and committees are as follows:—

MUNICIPAL, STATE AND FEDERAL PREVENTION.

Chairman, Dr. William H. Welch, Professor of Pathology, Johns Hopkins Medical School, Baltimore, Md.

Secretary, Dr. John S. Fulton, Secretary-General International Congress on Hygiene and Demography, Washington, D. C.

Full and accurate information concerning the infant population and infant mortality is the indispensable basis of an intelligent effort to check the waste of infant life.

Accurate enumeration of the living under one year of age is not to be expected; at least it has not been accomplished, and on this account most civilized countries have agreed that the infant mortality shall be expressed by means of the ratio of the dead under one year to the infants born during the year. This accepted mode of statement is impossible in this country because American States and cities, with few exceptions, neglect or fail to record the births occurring.

Some American cities take no heed of deaths of infants under certain ages. Deaths of infants two weeks old or under may be, and in some cities are, thrown out of the mortality account.

The definition of a "still birth" varies from time to time and from place to place. Infants of days, or of weeks, may be counted as still births. Frequently no publication is made of the numbers included under the title "still births."

The recorded mortality of the registration *area* shows that one-fourth of the total mortality occurs at or under the age of 2.68 years. This figure includes large urban populations, and these, being stated separately, show that one-fourth of all the dead in the registration cities are dead at or under the age of 1.8 years. Thus the campaign against infant mortality appears to be largely a municipal problem.

As the mortality under five years of age overtops the mortality of succeeding quinquennia, so the mortality under one year dwarfs that of succeeding years, and so the mortality of the first month dwarfs that of succeeding months. In this way we are led to suggest that statement in terms of months gives a coarse and perhaps deceptive reading of the mortality of early infancy.

In so far as the recorded information concerning infancy is insufficient or poorly studied, in so far must defensive measures be imperfectly designed, vaguely applied, and of doubtful effect. To supply the indispensable basis of recorded information is the

first and undivided duty of government in relation to the hygiene of infancy.

The session on municipal, State and federal prevention will be devoted mainly to the need of *birth registration*, and of *mortality registration*, including more specific accounting for the mortality of early infancy, and for still births.

There will be a discussion of the antenatal causes of mortality and of some of the approved governmental measures for the defense of infancy.

MEDICAL PREVENTION.

Charman, Dr. L. Emmett Holt, Professor of the Diseases of Children, Columbia University, New York City.

Secretary, Dr. Philip Van Ingen, 125 E. 71st Street, New York City.

Among the subjects to be considered are:—

The extent to which artificial feeding is practiced both among the better classes of society and among the poor, and its influence upon infant mortality.

The influence of maternal nursing upon infant mortality and the means and agencies by which maternal nursing may be promoted among all classes.

The part which education plays in infant mortality, including education of physicians in the medical schools and the education of nurses for special work, also the educational function of institutions, particularly infant hospitals.

A discussion of the various diseases which may be most influenced by the adoption of proper hygiene and other preventive measures, *e.g.*, pneumonia, tuberculosis, etc., and others which are not amenable to such reduction.

Among those who have already promised to take part are: Dr. W. W. Butterworth, New Orleans; Dr. S. M. Hamill, Philadelphia; Dr. Herman Schwarz, New York City; Dr. T. S. Southworth, New York City, and Dr. Ira S. Wile, New York City.

EDUCATIONAL PREVENTION.

Chairman, Dr. Helen C. Putnam, chairman of the committee to investigate the teaching of hygiene, appointed by the American Academy of Medicine, 1903, Providence, R. I.

Secretary, Prof. Abby L. Marlatt, Department of Home Economics, University of Wisconsin, Madison, Wis.

Topic: Healthy parents, right customs and wholesome environment being essential factors in preventing infant mortality, how are normal institutions fitting teachers to establish through public schools better practices in hygiene and sanitation and higher ideals of parenthood?

PHILANTHROPIC PREVENTION.

Chairman, Dr. Hastings H. Hart, Director of the Department of Child Helping, The Russel Sage Foundation, New York.

Secretary, Mr. Sherman C. Kingsley, Superintendent of the United Charities, Chicago.

Among the subjects to be considered are:—

The production and distribution of clean milk; milk commissions; home care of milk; relation to the problem of infant mortality.

Schools for mothers; milk stations, extent and value in this country and abroad; social, medical and nursing aspects; summer and winter programmes; relation to and co-ordination with social movements.

EXHIBITION.

An exhibition will be held in connection with the meeting.

The chairman of the committee in charge is Dr. Marshall L. Price, Secretary of the State Board of Health, Baltimore.

The object of the committee will be to put in concrete form the known factors in the causation of infant mortality and the simple and logical means of prevention.

A considerable portion of the exhibit will be devoted to milk work of Departments of Health, State, City and National; Medical Milk Commissions; influence of feeding on infant mortality; the contagious diseases conveyed by milk; and the specific causes of infant mortality, especially cholera infantum.

It is the purpose of the committee to obtain statistics of infant mortality extending into the antenatal period as well as that of the early weeks of life. As regards the infant itself, the exhibit will consider suitable clothing, diet, hot-weather care of infants, and the early recognition of conditions which may lead to serious after-results. It is hoped to conduct mothers' classes in connection with the exhibition.

It is the intention of the committee to have all its material in simple, direct form, so that it can be readily understood by the public, and possess a direct educational as well as a scientific value.

PUBLICATION OF TRANSACTIONS.

The proceedings of the meeting next November will be published immediately after the close of the Conference. A copy of the transactions will be sent to each member of the Association.

Officers.—President, Dr. J. H. Mason Knox, Jr., Baltimore; President-elect, Prof. Chas. Richmond Henderson, Chicago; Vice-presidents, Prof. C. E. A. Winslow, Boston; Mr. Homer Folks, New York; Secretary, Dr. Linnæus E. La Fétra, New York, Editor ARCHIVES OF PEDIATRICS, 113 East 61st Street. Treasurer, Mr. Austin McLanahan, care Alexander Brown & Sons, Baltimore.

Executive Committee.—Mr. Robert W. Bruère, Dr. John S. Fulton, Dr. J. H. Mason Knox, Jr.; Dr. Linnæus E. La Fétra, Dr. J. S. Neff, Dr. Helen C. Putnam, Dr. Mary Sherwood.

Executive Secretary, Miss Gertrude B. Knipp, Medical and Chirurgical Faculty Building, Baltimore, Md.*

HEMORRHAGE OF THE ADRENALS IN INFANTS.—From an analysis of 119 cases, 2 of which they report, J. C. Litzenberg and S. M. White (*Journal of American Medical Association*, December, 1908) conclude that hemorrhage of the suprarenal capsules is more common than hemorrhage in the other viscera in the newborn. This is due primarily to the close relation of the adrenals to the vena cava, making congestion easy, and to the peculiar anatomic construction which favors hemorrhage. A weakness of the vessel walls, either normal delicacy or pathologic alteration, favors the rupture. The place of election of the hemorrhage is usually in the internal cortical zone because of its vascularity and the anastomotic arrangement of the vessels. The bleeding always follows active or passive congestion. Passive congestion may be caused by difficult labors, obstetric operations, thrombosis, or anything else that would favor venous stasis. Active congestion is induced by infection or any toxemia which incites hyperemia by a superactivity of the gland. The finding of the pneumobacillus of Friedlander in the 2 cases reported and other bacteria in 5 additional cases proves beyond question that infection is a cause of adrenal hemorrhage. Death results either from loss of blood or an interference with the physiologic function of the gland.—*American Journal of Obstetrics.*

* For information or circulars write to the Executive Secretary.

MISCELLANY.

INCREASED TIME FOR THE STUDY OF THE MEDICAL AND SURGICAL DISEASES OF CHILDREN.

The Association of American Medical Colleges has for several years been engaged, as many are aware, in formulating a minimum curriculum for the medical schools.

At the meeting held in Baltimore in March the report of the Sub-committee for the Clinical Years was presented. Of this Sub-committee Dr. H. D. Arnold was chairman and Dr. S. W. Kelley the member appointed for pediatrics.

The report raises the time allowance for pediatrics from one hundred hours to one hundred and fifty hours, and further states as follows: "The allowance for pediatrics is intended to include instruction in the exanthemata. In many other ways medicine and pediatrics overlap. Useless repetition can only be avoided by a proper understanding between the teachers of these two subjects, and a certain elasticity should be allowed a school for the purpose of assigning time to one subject or the other, according to where the borderland subjects can best be taught. In the same way pediatrics and surgery touch and overlap. In one subject or the other the surgery peculiar to children should receive attention. Valuable suggestions in relation to the teaching of pediatrics will be given in an appendix to this report."

A communication was received from the Association of American Teachers of the Diseases of Children advocating that one hundred and ninety hours' time be allowed. But the curriculum for the third and fourth years is so crowded with important subjects that the entire time of 4,000 hours seems quite inadequate, and one hundred and fifty hours as a minimum for pediatrics was finally agreed upon.

SOCIETY REPORTS.

THE PHILADELPHIA PEDIATRIC SOCIETY.

May 10, 1910.

J. TORRANCE RUGH, VICE-PRESIDENT, CHAIRMAN.

ANEMIA WITH GREATLY ENLARGED SPLEEN.

DR. ARTHUR NEWLIN showed two children with greatly enlarged spleens. The first was a boy, two and one-half years old, in whom anemia was noted after two suppurating swellings had appeared on the knee and one on the cheek, which healed without trouble. The parents are Russian Jews, both well, as was the child previously. The spleen extended from the eighth rib to two inches below the crest of the ilium, and over to the midabdominal line. Hemoglobin was 25 per cent. erythrocytes 1,810,000, and leukocytes 18,400. Differential count gave 12.2 per cent. polymorphonuclears, 81.4 per cent. lymphocytes, 2.4 per cent. large mononuclears, 1.8 per cent. eosinophiles, and 2.2 per cent. myelocytes. One round worm was passed, though no ova or parasites could be found in the stools. The second case was an Italian girl, aged three. Her spleen reached the midabdominal line, the symphysis pubis occupying the entire left side of the abdomen. Hemoglobin was 30 per cent., erythrocytes 1,700,000, and leukocytes 71,800. Differential count gave 42.8 per cent. polymorphonuclears, 20.8 per cent. lymphocytes, 4 per cent. large mononuclears, and 28 per cent. myelocytes. The child began to improve without treatment, and in ten months after first having been observed gave a normal percentage of the various sorts of leukocytes.

DR. ALFRED HAND, JR., showed two boys with anemia and enlarged spleen, the older being an instance of so-called splenic anemia, the younger having a history of malaria, showing tremendous enlargement of the spleen. The older, aged three and one-half, was admitted with bronchopneumonia, having been ill two weeks; the lungs cleared up quickly, but enlargement of the spleen, 8 cm. below the costal border, persisted. On admission, March 26th, examination of the blood gave hemoglobin, 35 per cent.; erythrocytes, 3,350,000, and leukocytes, 5,680. Differential count showed 3.3 per cent. myelocytes, 41.6 per cent. lymphocytes, 46.6 per cent. polynuclears, and 8.2 per cent. large

mononuclears. On May 10th hemoglobin was 80 per cent., erythrocytes 4,200,000 and leukocytes 7,100. The treatment was an organic iron preparation by mouth, but as improvement was slow hypodermics were also given daily for several weeks of citrate of iron, $\frac{3}{4}$ grain; sodium glycerophosphate, $1\frac{1}{2}$ grains, and sodium cacodylate, $\frac{3}{4}$ grain. The second boy, twenty months old, was born in New Jersey, and had chills and fever eight months ago, the plasmodium being found in the blood. It was also found, on admission to the Children's Hospital five weeks ago, with a profound anemia, 35 per cent. hemoglobin, 3,000,000 erythrocytes, and now shows 50 per cent. hemoglobin and 3,500,000 erythrocytes. The spleen could not well be any larger in this patient, extending as it does into the right iliac fossa.

DR. A. A. ESHNER spoke of the first of these cases, which he had at first thought might be a case of pseudoleukemic anemia of infants. Later, after examination of the blood, it appeared to be one of leukemia. He remembered that a round worm was passed while the child was in the Polyclinic Hospital. The swellings on the lower extremity and the face might have been extravasations of blood, with secondary suppuration, or perhaps leukemic accumulations.

DR. S. MCC. HAMILL said that Dr. J. M. Swan had studied the stools in this case, but had never found any ova. An X-ray showed enlarged bronchial glands in this patient, who still has a high temperature, as she has had all along. A blood culture was negative.

DR. THEODORE LE BOUTILLIER had had a case of supposed leukemia in a child with a history of chronic malaria, in whose blood plasmodia were found, which explained the large spleen, reaching from the margin of the ribs to the crest of the ilium and to the median line. This child very recently had a return of the malaria, but without any great enlargement of the spleen. The child's condition has greatly improved.

DR. GITTINGS said that Dr. Newlin's second patient exhibited the sudden transformation from a negative count to a well-marked myelocytosis, which is sometimes observed. One must not be thrown off guard by these remissions, in view of the fatal tendency which most of these cases sooner or later exhibit.

DR. NEWLIN added that a von Pirquet tuberculin test was

applied in the first case, which was suggestive but not absolutely positive. In the second case a Moro test was positive. No tuberculous pulmonary lesions were discovered. The improvement in the second case was entirely independent of treatment, as the child was brought to the hospital at rare and irregular intervals and received medication in the form of syrup of the iodid of iron only spasmodically. This case is evidently one of splenomyelogenous leukemia, and is at present in the stage of remission. The first case, from the blood counts, might possibly be one of lymphatic leukemia.

SPASMUS NUTANS.

DR. HOWARD K. HILL reviewed the literature upon spasmus nutans, or head nodding with nystagmus, in infants, beginning with reports by Ebert and Faber in 1850, and Hensch and Bomberg in 1851, and especially the later papers by Hadden in 1890, Raudnitz in 1897, J. Thomson in 1900, and Still. He showed 3 cases from his service in the Children's Medical Dispensary of the Presbyterian Hospital, all of which showed signs of rickets. In all 3 symptoms began in the dark months of the year; 2 had lived in poorly-lighted, dark rooms, and began to show symptoms when respectively two and a half, ten and twelve months of age. In all 3 there was a nervous history, and in 1 a distinct retrograde neurotic inheritance. There was no history in any case of a head injury. Two of the children held their heads in the position peculiar to this disorder and looked out of the corner of their eyes. The nystagmus seemed to outlive the head nodding in 2 of the cases in which the latter had almost disappeared.

DR. HAMILL said that he had reported 3 such cases with Dr. Posey. The condition was found in children with rickets and after prolonged diarrhea. Strabismus is not uncommon as a cause of nystagmus, and with these cases nodding or rotary spasm is often found.

THE INFANT'S THORAX: DEMONSTRATION OF FROZEN SECTIONS.

DRS. GEORGE FETTEROLF (by invitation) and J. CLAXTON GITTINGS read a paper and exhibited sections of frozen cadavers, illustrating some anatomic features of the infant's thorax and their practical application in physical diagnosis. They emphasized the fact that the mere opening of the thorax and abdomen in the

anatomic laboratory or at autopsy will of itself cause a change in the shape and relation of the various organs. When conditions are still further disturbed by dissection or by successive stages of an autopsy, it is possible only to get an approximate idea of the conditions as they existed during life. A study of the sections corrected several anatomic misconceptions and explained the mechanism of certain clinical phenomena.

DR. HAND said that this demonstration had been to him the most interesting that he had ever heard or seen at this Society. A formal vote of thanks was then extended to Drs. Fetterolf and Gittings for their excellent anatomic demonstration.

INDISCRIMINATE ENUCLEATION OF THE TONSIL.—P. Fridenberg (*New York Medical Journal*) says that enucleation as at present performed by competent operators is so effectual in removing a diseased organ that it would be doubly deplorable if it should come into disrepute, but he fears that such may be the case unless the zeal of the moment in this respect is restrained and we learn to perform the operation in proper instances only. He questions whether the removal of the tonsil with its capsule is either safe or useful in most cases. We know so little of the physiology of the tonsil, and especially of its capsule as a possible protecting mechanism, so little as to its part in so important a function as voice and tone production, that its complete removal, except for valid cause, must be earnestly deprecated. There are cases of submerged, adherent, irregular, or cystic tonsils, in which recurrent attacks of inflammation, evident disease, or extreme susceptibility to the acute exanthemata and infections of the upper respiratory tract, from colds to influenza, supply an operative indication which, quite in contradistinction to the factor of obstructed respiration, calls for radical removal of a source of infection, and not for more air space. Let enucleation of the tonsil, whether by finger or separators, by snare or scissors, be reserved for these cases. While there is no excessive hemorrhage, there is much traumatism, marked reaction, a slough which lasts for some time, and pain on swallowing which may not entirely disappear for a week or two. In at least one case of which the author has heard, extensive adhesions formed which glued together the pillars of the fauces on one side, with disastrous results for a previously beautiful singing voice.—*Medical Record*.

CURRENT LITERATURE.

ABSTRACTS IN THIS NUMBER BY

DR. S. FELDSTEIN.	DR. C. D. MARTINETTI.
DR. ALFRED F. HESS.	DR. M. C. PEASE, JR.
DR. B. RAYMOND HOOBLER.	DR. FRITZ B. TALBOT.
DR. S. W. THURBER.	

DISEASES OF THE EAR, NOSE AND THROAT.

PHILLIPS, W. C.: THE VALUE OF EARLY DIAGNOSIS AND TREATMENT OF ADENOIDS. (*The Woman's Medical Journal*, May, 1910, p. 95.)

Prof. Phillips urges that these children be operated on in the hospital, where a proper anesthetic can be given and where a competent house staff can watch the case for a few hours after the operation. It is his belief that the adenoids should never be removed without an anesthetic, not only because it is painful, but also for the reason that it is impossible to make a complete removal without it. According to his observation, when there is complete removal of adenoid tissues a recurrence is very rare. In patients over four or five years of age, where the adenoids have been completely eradicated and the tonsils carefully dissected out, there should be no recurrence. The reason of so many recurrences is that the primary operation has been unskillfully done or incompletely performed.

M. C. PEASE, JR.

FOSTER, E. E.: INTRANASAL MEASUREMENTS WHICH INDICATE THAT PALATAL EXPANSION INCREASES THE WIDTH OF THE NASAL FOSSÆ. (*Annals of Otology, Rhinology and Laryngology*, March, 1910, p. 121.)

The relationship between nasal obstruction and deformities of the superior maxilla has been studied under two heads—the type of skull and developmental influences. The following factors may influence the shape of the developing superior maxilla, all due to imperfect nasal breathing: (1) Absence of the mechanical force of the air upon the walls and sinuses of the

nose, and the abeyance of the natural functions, with the want of proper blood supply. (2) Lack of constant apposition of the upper and lower teeth, which destroys an important factor in forcing outward the upper teeth. (3) Continued downward and inward pressure against the lateral teeth by the muscles of the cheek and the absence of the backward pressure of the muscles of the lips against the front teeth. (4) Loss of the vacuum between the upper surface of the tongue and hard palate, which tends to pull the palate down. (5) Absence of the constant lateral pressure of the tongue against the alveolar arch.

The author believes that prenatal influences tend to produce in certain individuals a narrow head with the associated narrow nose and jaws and that postnatal influences may interfere with the normal development of these.

The indications for treatment are to relieve the nasal obstruction and then have an orthodontist expand the palatal arch and produce normal occlusion of the teeth.

The author cites a number of cases in which his measurements prove that widening the palatal arch also widens the nasal cavities, and this can be easily accomplished in the child.

S. W. THURBER.

JOHNSON, RICHARD H.: EXTENSION AND FLEXION IN DIRECT LARYNGOSCOPY: A COMPARATIVE STUDY. (*Annals of Otology, Rhinology and Laryngology*, March, 1910, p. 19.)

There are two methods of direct examination of the larynx—in the one the head is extended, and in the other it is flexed. With most operators the former position has given an unsatisfactory view of the anterior part of the larynx, and but a few, well skilled in the use of the laryngeal spatula of Jackson, are able to see the anterior laryngeal commissure, either under local anesthesia in the adult or in the child under a general anesthetic. This state of affairs led Mosher, of Boston, to publish, in April, 1908, his method of "left lateral route," which he claims was successful in 50 per cent. of the cases undertaken. In the summer of 1908 the author, in attempting the removal of a laryngeal papilloma in a child of four years, under general anesthesia, flexed the head on the patient's chest and was then able to get a very clear view of the whole larynx with a Jackson speculum. The next patient, a girl of six, was thus examined without anesthesia of any kind,

and the author has now been using this method in the straight, flexed position with entire success. He would emphasize the superiority of this method in children. It is necessary to use a speculum in which the vertical part of the handle can be detached, leaving but the first right angle, which does not impinge on the chest of the patient.

S. W. THURBER.

PATHOLOGY.

EMMONS, A. B., 2D: THE DIAGNOSTIC VALUE OF THE SEARCH FOR SPIROCHETA PALLIDA IN THE UMBILICAL CORD OF THE NEWBORN. (*Boston Medical and Surgical Journal*, May 12, 1910, p. 640.)

Emmons concludes from his study that *spirocheta pallida* is rarely found in the cords of the syphilitic newborn. When positive results are obtained they are present in considerable abundance in the muscularis of the umbilical vein in sections taken from the neighborhood of the umbilicus. A large proportion of syphilitic newborn, as shown by microscopic examination of the placenta, as well as by characteristic autopsy findings with *spirochetæ* demonstrable in the liver, show that *spirochetæ* could not be found in the cord even after extensive search. Accordingly, a negative diagnosis cannot be made by this procedure alone.

FRITZ B. TALBOT.

POYNTON, F. J., AND PAINE, ALEXANDER: SOME FURTHER INVESTIGATIONS AND OBSERVATIONS UPON THE PATHOLOGY OF RHEUMATIC FEVER. (*The Lancet*, June 4, 1910, p. 1,524.)

About ten years ago these authors presented two main conclusions concerning the etiology of rheumatic fever, both of which they are more than ever convinced still hold good. These conclusions are: first, that a diplococcus, streptococcus or micrococcus is a cause, and most probably the only exciting cause, of acute rheumatism; secondly, that acute rheumatism may be a cause of simple and malignant endocarditis.

They answer a number of criticisms which have been raised concerning these conclusions. One criticism, namely, that other workers were not able to isolate the organism, is answered by

stating the details of four examples in which others had isolated the organism and forwarded it to them, by the inoculation of which they were able to produce all the symptoms of acute rheumatism in rabbits, which they were able to produce with the specific micrococcus which they claim to be the exciting cause. They believe that no other organism can be found in the rheumatic lesions of man which will produce similar lesions in animals.

These writers undertook the study of the tonsils in the rheumatic. In all 6 cases were studied, one of which was reported as an example of the kind of case investigated as follows: A boy, ten years of age, who two years before had had an attack of rheumatic fever, was admitted to hospital suffering from slight chorea and rheumatic pains. Examination of heart showed considerable mitral regurgitation with hypertrophy and dilatation. In addition, he had two very large tonsils and was subject to sore throat.

These tonsils were enucleated, and under proper precautions cultures were taken from the deep part of the gland, which showed almost a pure growth of streptodiplococci, which were later inoculated into rabbits, producing arthritis and fatal aortic endocarditis. Smaller amounts produced only arthritis, from which they slowly recovered.

They have studied the types of arthritis which may be produced, and are convinced that various forms, both suppurative and non-suppurative, may be caused by their organism. Not only does it produce arthritis, but changes in bone, such as osteoarthritis and rarefying osteitis. Various fibroid changes can be produced, such as perivascular fibrosis.

They have concerned themselves with the age at which rheumatic manifestations may occur, and believe that it is by no means rare in the very young, although infancy seems to be protected from exposure.

B. RAYMOND HOOBLER.

ORTHOPEDICS.

ELY, L. W.: PRACTICAL HINTS ON JOINT TUBERCULOSIS. (*Long Island Medical Journal*, June, 1910, p. 189.)

The author, after the study of many specimens, concludes that the origin of tuberculosis in joints may be either primarily in

the bone or synovial membrane, as opposed to the more commonly accepted view that it is always bony. Healing in children may be brought about by bony union; and in them a cure may take place with a fair amount of function, or even with an almost normal joint or with one quite normal. Less is known of the pathology of children's joints than of those of adults, for fortunately they are rarely resected nowadays and the specimens are few. In adults almost always, and in children usually, a *restitutio ad integrum* means a mistaken diagnosis.

Every effort should be made to reach a diagnosis. Clinical examinations, the X-ray, the tuberculin reaction, the animal tests, and a laboratory examination of a clipping from the tissue of the joint are all methods which are at our disposal.

The local treatment should have two aims: First, to put the joint at rest, and, second, to avoid secondary infection by pus-producing germs. The general treatment consists of fresh air (sea air), good food, the removal of tonsils, adenoids, etc.—in fact everything should be done which will establish the general good health of the patient.

M. C. PEASE, JR.

MEDICINE.

BARBIER, D.: PERIODICAL VOMITING IN CHILDREN. (*XVI. Congreso Med. Inter.*, August, 1909.)

Periodical or cyclical vomiting occurs sometimes in children under eight years. Less frequently in girls. Occasionally several cases occur in one family. A neuroarthritic condition of the parents may be a predisposing cause, as shown by the presence of adenoids, dyspepsia, easy vomiting, enterocolitis and appendicitis.

Sometimes an autopsy reveals steatosis of the liver as a consequence of digestive disorders. Periodical vomiting always awakens a suspicion of appendicitis. It is best to proceed by exclusion, eliminating acute indigestion, poisoning, intestinal obstruction, peritonitis. The best treatment is by alkaline substances, sodium bicarbonate, vegetables as diet, hydrotherapy. Chronic appendicitis usually improves greatly under this plan. In a crisis food must be withheld, hypodermoclysis should be resorted to and

serum injections. Stomach lavage and morphin hypodermically control vomiting. In the majority of cases we will find appendicitis, for which the remedy is naturally an operation.

C. D. MARTINETTI.

STERN, HEINRICH: THE DIFFERENTIAL DIAGNOSIS OF LOBAR PNEUMONIA. (*American Medicine*, April, 1910, p. 168.)

Dr. Stern, in his article dealing with the differential diagnosis of lobar pneumonia in children, makes the point that the condition is often mistaken for meningitis; and that the diagnosis must depend upon the physical signs and a cytologic study of the spinal fluid. Pneumonia is not uncommonly ushered in with convulsions, while in meningitis the convulsions, as a rule, occur at a later stage. Furthermore, it should be noted that headache in pneumonia is usually frontal, while in meningitis it is occipital and accompanied by retraction of the muscles of the neck. Absence of a Kernig, the occurrence of a crisis, and a disturbance in the pulse-respiration ratio are all significant of pneumonia.

M. C. PEASE, JR.

HARRIS, ALFRED: THE OCCURRENCE OF ACETONURIA IN CASES OF INFECTIOUS DISEASES. (*The Lancet*, May 14, 1910, p. 1,346.)

Dr. Harris has found that acetone bodies occur quite regularly in the urine of scarlet fever and diphtheria patients. Out of 197 cases of scarlet fever 167 showed acetone in urine. Out of 96 cases of diphtheria studied 87 were found to have acetone.

He believes the presence of acetone may be of aid in early diagnosis between simple tonsillitis and the sore throats of diphtheria and scarlet fever.

B. RAYMOND HOOBLER.

ALLARIA: AN INTERMITTENT FORM OF TUBERCULOUS MENINGITIS. (*La Pediatria*, July 5, 1909.)

The case described is that of a child, who, after three weeks' illness, appeared to have completely recovered. He was well for two months and then suddenly meningeal symptoms returned, death ensuing after one month. According to Allaria, in similar intermittent forms the tuberculous process develops at intervals.

During the intervals the primary lesion becomes attenuated, ceasing finally to exist. The patient then apparently is well but weak. If for any reason the activity of the germs is re-awakened a second attack follows, usually fatal.

C. D. MARTINETTI.

HAMBURGER, F.: THE FREQUENCY OF TUBERCULOSIS IN CHILDHOOD. (*Beiblatt zu den Mitteil. der Gesell. für Innere Mediz. und Kinderhk. in Wien.*, April 22, 1909, Vol. VIII.)

The author examined 509 children suffering from acute infectious diseases, with the exception of measles, by means of the von Pirquet and the subcutaneous tuberculin reactions. Those which were negative with the von Pirquet (concentrated tuberculin being used) were subsequently injected with $\frac{1}{10}$ to 1 mgm. of tuberculin subcutaneously. Those cases reacting positively with either one or the other of these tests were considered positive. Dividing these cases in six age groups, the author and Monti found a progressive increase in positive reactions, ranging from 9 per cent. in the second year of life to 94 per cent. in the thirteenth and fourteenth years. During the third and fourth years the percentage was 27; during the fifth and sixth years it was 51; while during the ages from seven to ten it had risen to 71 per cent.

These percentages are higher than those formerly found at autopsy, when the lethal cases were excluded, but this fact the author attributes to the frequency with which small tubercular lesions were overlooked in former years. The results of the post-mortem examinations at the St. Anna's Children's Hospital during 1908, corresponded much more closely with the author's figures than did those of earlier years. Ganghofner's results at Prague with von Pirquet reaction alone yielded percentages which corresponded closely with those of the author's during the first six years of life. From six to fourteen years Ganghofner's figures were considerably lower than those of the author. This fact is attributed to the probability of the von Pirquet reaction not revealing all cases of inactive tuberculosis.

These high figures do not indicate the frequency of tuberculosis as a disease, but merely the frequency of infection with tubercle bacilli. In the author's opinion, most individuals have become infected with the tubercle bacilli before the fourteenth year, but as

a result of this infection they have acquired immunity against tuberculosis as a disease.

S. FELDSTEIN.

GÖTZKY, F.: ORTHOTIC ALBUMINURIA. (*Jahrb. für Kinderhk.*, April 1, 1910, p. 427.)

This exhaustive paper from Heubner's Clinic is based on 12 cases which were studied with minute care. In addition to these the author personally examined the urine of 346 children from five to thirteen years of age and found the condition of orthotic albuminuria in 51 cases, or 14½ per cent. In this series there were 12 per cent. boys and 17 per cent. girls. From the records of the polyclinic the author obtained the following figures: among 2,158 children there were 123 cases of orthotic albuminuria, or 5.7 per cent. In another series of 2,031 children there were 90 cases of this type of albuminuria, that is, 4.4 per cent.

These children did not present any definite habitus. Some were normal, with the exception of the presence of albumin in the urine. Others suffered from headache, loss of appetite and cardiac palpitation; some from general weakness, and still others from more or less marked hysterical symptoms. In the heart there was no abnormality that could be found with any degree of regularity. The first sound at the apex was occasionally impure, only rarely was a murmur audible. At times slight arrhythmia or tachycardia was noticed. The author never saw cardiac hypertrophy or dilatation in these cases. Quite frequently the pulse showed variations in intensity and frequency on change of position. A well-marked dermatographia was found in all cases. It was intense and lasting and was never observed in as marked a form in other conditions.

In the urine three proteids were found. The first, and usually the most abundant, is a body which is precipitated by dilute acetic acid in the cold. It is probably not a nucleo-proteid, as it contains little or no phosphorus. The other two proteids are albumin and globulin and are demonstrable by the addition of potassium ferrocyanide or on boiling. The predominance of the body precipitable by dilute acetic acid is of diagnostic significance, as it is not often found in nephritis.

The diagnosis of orthotic albuminuria is based on the fact that albumin is present in the erect posture only and on the continued absence of red blood cells and renal elements in the sedi-

ment. Occasionally red blood cells and casts may appear in the urine, but their presence then is due to a temporary local infection of the kidneys, a condition which not infrequently appears as a complication of various general infections. The continued presence of renal elements, even in very small quantities, of necessity excludes the diagnosis of an uncomplicated orthotic albuminuria.

As to the pathogenesis of this condition numerous theories have been advanced. The two that have been most under discussion are the mechanical and the vasomotor.

Jehle is the chief advocate of the mechanical theory. He has proven, and the author has been able to confirm his experimental work, that artificial lordosis of the upper lumbar region, which can be readily produced by placing the patient in certain postures, leads almost immediately to the excretion of albumin, red blood cells and casts. This phenomenon Jehle attributes to mechanical pressure on the inferior vena cava and consequent passive congestion in the renal veins and kidneys. Erlanger and Hooker, however, have found that passive congestion of the kidneys brought about by breathing highly compressed air does not cause albuminuria. In their very carefully conducted experiments on an adult patient suffering from this type of albuminuria they found that the excretion of albumin began at an angle of 40° to the horizontal and that it ceased immediately when the patient was inverted at this angle. The albuminuria disappeared when the legs and thighs were tightly compressed by pneumatic apparatus. During the period of albuminuria they found an increase in the minimum pulse pressure, while the maximum was unchanged, thus resulting in a reduction of the total pulse pressure. The product of the pulse frequency and pressure remained constant. Water and salts were excreted in diminished amounts. They therefore attribute the occurrence of orthotic albuminuria to deficient vasomotor action on change of posture, with resulting diminution of pulse pressure and consequent disturbance of renal function. In the author's opinion this is the correct view of the pathogenesis of orthotic albuminuria. Jehle's mechanical theory the author rejects because of the lack of clinical confirmation of his claim that lordosis is frequently present in these cases. On the other hand, cases of lordosis are not infrequently seen in which no albuminuria is present. Moreover, in most of Jehle's cases red blood cells and renal elements were present in the sedi-

ment. This fact leads the author to think that Jehle was dealing with cases of chronic nephritis of the orthotic type and not with orthotic albuminuria.

The prognosis is favorable, but depends in great part on the general condition of the patient. As most of them are in a debilitated condition they are exposed to the danger of renal infection. This fact should not be forgotten in the treatment, which should be chiefly prophylactic. Proper care as regards clothing, exercise and baths is demanded. The albuminuria *per se* requires no treatment.

S. FELDSTEIN.

POLLAK, R.: INFANTILE TUBERCULOSIS. (*Mitteil. der Gesellsch. für Innere Mediz. und Kinderhk. in Wien.*, March 17, 1910, Vol. IX., No. 5.)

Since 1908 the author observed 92 cases of tuberculosis—30 cases in the first year of life, and 62 in the second year. The youngest child was thirty-nine days old. Bronchial-node tuberculosis was seen forty-six times. In 22 there were present typical tuberculides. Pulmonary infiltration was present in 17 cases. Six cases showed the presence of phlyctenulæ. There were 6 cases of bone tuberculosis, and 17 cases of tuberculous meningitis. In the first year the mortality was 85.7 per cent.; in the second year 58.7 per cent. The prognosis depends on the age and the severity of the infection. When the infant was infected from a fatal case of tuberculosis the disease was very frequently fatal. Mild cases of adult tuberculosis gave rise to milder infantile tuberculosis. These infants not infrequently survived the first year of life. Nursing plays a very important rôle in the prognosis. Most of the surviving cases developed within six months the tuberculous habitus, which is characterized by pallor, emaciation, flabbiness of the muscles, long eye-lashes, and hair over the temples and between the shoulder blades. Of 200 children living in tuberculous surroundings only 9 gave a negative tuberculin (subcutaneous) reaction. Children under four years of age, when exposed to infection, acquire the manifest form of the disease, while those over four years do not usually give evidence of manifest tuberculosis, or even of the tuberculous habit. When these older children do present tuberculous symptoms it usually means a recurrence of a tuberculous affection acquired in infancy.

S. FELDSTEIN.

HYGIENE.

SOBEL, JACOB: THE HOME AS A FACTOR IN THE MEDICAL INSPECTION OF SCHOOL CHILDREN. (*New York Medical Journal*, June 4, 1910, p. 1,157.)

Dr. Sobel pictures very graphically the conditions found in the homes of many of the New York City school children.

Many difficulties lie in the way of improving such conditions, but that they are being improved is shown by a report quoted from Dr. S. J. Baker, chief of the Division of Child Hygiene of the Department of Health, as follows:—

PHYSICAL DEFECTS—1908-1909.

Number of children examined	323,344
Number of children found needing treatment ..	242,088
Number of children receiving treatment	203,488
Percentage receiving treatment	84.06

B. RAYMOND HOOBLER.

THERAPEUTICS.

STELLWAGEN, THOMAS C.: THE TREATMENT OF GONORRHEAL INFECTIONS BY ANTIGONOCOCCIC SERUM. (*The Therapeutic Gazette*, April 15, 1910, p. 248.)

Dr. Stellwagen's article is based upon the results of the treatment of 27 cases with antigonococcic serum. The serum was obtained from fully developed, non-castrated rams, immunized to several strains of the gonococcus, producing a practically non-toxic polyvalent serum. The serum obtained from immunized rabbits and goats was found in many instances to be highly toxic.

The results obtained by this treatment were in the main satisfactory, his conclusions being as follows:—

- (1) Acute and chronic urethritis do not yield to serum treatment, but the use of serum renders the patient more readily amenable to local treatment.
- (2) Prostatitis is frequently benefited by the use of the serum.
- (3) Epididymitis has often been cured by its administration.

(4) In gonorrheal arthritis the antigonococcic serum has proved to be practically a specific.

(5) In all gonorrheal complications we believe serum treatment is indicated.

(6) We have found the daily administration of 2 or 4 c.cm. of serum, depending on the severity of the case, gives the most satisfactory results.

(7) No inconvenience was experienced by the patients, other than a slight eruption, which soon disappeared.

Unfortunately, no cases of vaginitis in children were included in this series, but in view of the good result obtained in adults it would seem that such a trial should be made; and with every expectation of at least fair results.

M. C. PEASE, JR.

MAROU, F.: AUTOSEROTHERAPY IN THE CURE OF PLEURAL EFFUSIONS. (*La Presse Medicale*, No. 71, 1909.)

The author has treated pleural effusion by means of injecting the aspirated pleural fluid subcutaneously. He has subjected 82 patients to the treatment, and in only one instance absorption failed to result. The technic is as follows: The chest is aspirated in the usual manner, and when 2 c.c. are obtained the needle is partially withdrawn and inserted into the subcutaneous tissue, into which the fluid is injected. The procedure is adopted in tuberculous or non-tuberculous exudates, in fact, in all non-purulent effusions. The result is that the temperature gradually falls; should it again rise the inoculation should be repeated a week later.

ALFRED F. HESS.

STEWART, F. E.: THE USE OF VACCINES IN THE TREATMENT OF PNEUMONIA. (*American Medicine*, April, 1910, p. 208.)

Dr. Stewart has reviewed in this article the literature bearing upon the treatment of pneumonia with vaccines, and reaches the following conclusion: "It would seem from the above evidence that pathologic conditions resulting from an acute pneumococcic infection can be relieved, removed, or modified, by injecting subcutaneously killed bacteria of the species causing the diseased condition. The collective investigation now under way in Massachusetts is attracting the attention of the profession, and it is hoped that a verdict will be reached supported by sufficient evidence to make it conclusive."

M. C. PEASE, JR.

BOOK REVIEWS.

CLINICAL TREATISES ON THE PATHOLOGY AND THERAPY OF DISORDERS OF METABOLISM AND NUTRITION. By PROF. DR. CARL VON NOORDEN, Professor of the First Medical Clinic, Vienna. PART VIII.: INANITION AND FATTENING CURES. PART IX.: TECHNIQUE OF REDUCTION CURES AND GOUT. Authorized American edition. Edited and translated under the supervision of ALFRED C. CROFTAN, M.D., Chicago, Ill. New York: E. B. Treat & Co., 1910.

These two new volumes in this well-known series are valuable contributions and complete what had been left unfinished in the earlier monographs, notably Vol. I., on the Indications for Reduction Cures.

One of the most attractive features of this series is that the author deals almost entirely with the essential details of his subject and presents it in the most concise form possible. This does not, however, make for difficult reading, for the style of the translation is very readable; but it does make every paragraph hold something vital and necessary to the subject in hand. This faculty makes these works doubly valuable in an age of little leisure.

In Volume VIII. the first part takes up Inanition and Undernutrition. This is a general discussion of the causes of loss of weight and the principles underlying the caloric needs of the body—the maintenance diet—together with many statistical facts concerning the loss in weight of different organs, tissues and chemical constituents of the tissues; a discussion of the excretion of the acetone bodies, and numerical data for calculating the degree of undernutrition. The second part treats of the indications for, and rational procedure in, fattening cures. Here it is interesting to note Von Noorden's view that no increase of true body albumin can take place in a previously healthy person without exercise, which gives a rational indication for its employment in these cures.

Volume IX. continues Volume I. by giving the technique of reduction cures and discusses Gout and Nephrolithiasis Urica, giving much space to our old friend uric acid. Here again it is definitely stated that red meats are not to be discriminated against, inasmuch as their purin content is essentially the same as that of light meats; and in the matter of tea and coffee it is stated that, though purin-containing, their transformation affects practically

not at all the uric acid content of the blood and they may be given in moderation.

These volumes are issued uniform with the earlier ones and are in a form handy for pocket use.

THE DISEASES OF INFANCY AND CHILDHOOD: DESIGNED FOR THE USE OF STUDENTS AND PRACTITIONERS OF MEDICINE. By HENRY KOPLIK, M.D., Attending Physician to the Mount Sinai Hospital; Consulting Physician to the Hospital for Deformities; Formerly Attending Physician to the Good Samaritan Dispensary, the St. John's Guild Hospitals, New York; Ex-President of the American Pediatric Society; Member of the Association of American Physicians, and of the New York Academy of Medicine. Third edition, revised and enlarged. Illustrated with 204 engravings and thirty-nine plates in color and monochrome. Pp. 944. New York and Philadelphia: Lea & Febiger, 1910.

It is a pleasure to observe that a third edition has been required of Dr. Koplik's book, which is certainly one of the few best textbooks on the diseases of children. This edition, which is somewhat larger than the previous editions, presents itself in very attractive form, printed on excellent paper, in large, well-spaced type and abundantly illustrated by reproductions both of photographs and of carefully executed drawings. Apparently no pains have been spared by author or publisher to enhance the book's attractiveness. As the preface indicates, much revision has been undertaken to bring the book up to date and considerable material has been added, but the recasting has been carefully done, for the book has not simply increased in size. One notes present-day matters in the mention of the serum treatment for meningitis, the subcutaneous tuberculin tests, the value of the spirocheta and the Wasserman reaction in syphilis, the relation of the parathyroids and deficient calcium retention to tetany, and although the work of American and Continental investigators in transferring poliomyelitis to monkeys is not noted, it is probable that the work is even later than the volume.

Especially to be mentioned are the sections on the various infectious diseases and the excellent chapter on feeding. The latter is one of the best in English from the standpoint of clearness and lack of bias; it is very full of detail in regard to maternal nursing and substitute feeding, but possibly might with advantage treat at greater length the feeding of older children.

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ORIGINAL COMMUNICATIONS.

A STUDY OF THE VALUE OF BRUDZINSKI'S "NECK SIGN" AND OF THE CONTRALATERAL REFLEX IN THE DIAGNOSIS OF MENINGITIS IN INFANCY AND CHILDHOOD.*

BY JOHN LOVETT MORSE, A.M., M.D.,

Assistant Professor of Pediatrics, Harvard Medical School; Associate Physician at the Children's Hospital and at the Infants' Hospital, Boston.

Brudzinski, in a paper on "The Contralateral Reflexes in the Legs in Childhood," published in 1908 (*Wien. klin. Woch.*, 1908, p. 255), drew attention to a sign which he found in tuberculous and in epidemic meningitis, and occasionally in other conditions, but never in healthy children. This sign was a concomitant reflex of the leg on one side when passive flexion of the leg on the other side was made—the identical contralateral reflex. Sometimes the

* Read at the Twenty-second Annual Meeting of the American Pediatric Society, Washington, D. C., May 3-5, 1910.

motion of the other leg was extension instead of flexion—the reciprocal contralateral reflex. He found the identical contralateral reflex in 6, and the reciprocal contralateral reflex in 1 of 8 cases of tuberculous meningitis, and the identical contralateral reflex in both of 2 cases of cerebrospinal meningitis. In some cases the reflex was present on both sides; in others, on but one. He also found it in a case of Little's disease. He concluded that in connection with other signs, such as Kernig's and Babinski's, it was useful in the differential diagnosis of meningitis. In a later paper (*Archives de Médecine des Enfants*, 1909, Vol. XII., p. 745) he states that further study has confirmed him in his conviction of the value of this sign, and that it has materially aided in the diagnosis of certain cases in which Kernig's and Babinski's signs were absent. He had then found it in 17 cases of tuberculous and 6 of cerebrospinal meningitis, the sign sometimes being present on both sides and sometimes on but one.

His explanation of this sign is, in brief, that there is a congenital tendency to bilateral innervation and that there is an anatomical connection between the centers of corresponding muscles. This connection is more definite and persists longer in the legs than in the arms because of the slighter differentiation of function in the former. When the cerebrum is diseased there is, in infancy and childhood, a tendency for the more specialized functions to revert to the younger type. The result of such reversion is the production of the contralateral reflex.

Greco (*Revue d'Hygiène et de Médecine Infantiles*, 1909, Vol. VIII., p. 130) never found this phenomenon in healthy children or in those ill with diseases of the gastrointestinal tract or lungs. He did not find it in children with rickets or backward in development. It was also absent in 1 case each of acute infantile paralysis, spastic paralysis, chronic internal hydrocephalus, idiocy and tetany, and in 2 of chorea. Its absence was of considerable value in ruling out meningitis in several cases, which were at first supposed to be meningitis, but which later turned out not to be. He reports 10 cases of tuberculous meningitis in which this sign was present, and concludes that its clinical importance in the diagnosis of tuberculous meningitis in young children is indisputable. The diagnosis in some of these cases seems, however, from the data given, somewhat doubtful.

Zaimovsky (*Archives de Médecine des Enfants*, 1909, Vol. XII., p. 796) confirms these observations and says that the con-

tralateral reflex is almost constant in children having an affection of the meninges.

Brudzinski, in 1909, published another paper entitled "A New Sign in the Legs in Meningitis in Childhood; The Neck Sign" (*Archives de Médecine des Enfants*, 1909, Vol. XII., p. 745), in which he stated that in meningitis passive flexion of the neck forward causes flexion of the legs at the hips and knees and a marked flexion of the legs on the pelvis. The test is performed by taking the head of the child, lying flat on its back, in the left hand and flexing it on the chest, the chest being held down by the right hand. He found this sign in 20 of 21 cases of tuberculous, in all of 11 cases of cerebrospinal, and in 2 of pneumococcus meningitis. The case of tuberculous meningitis in which this sign was not obtained was not examined until just before death. In one of the cases of pneumococcus meningitis the neck-sign was the only one of the usual signs of meningitis present. He also found it in 8 cases of serous meningitis, which developed in the course of different infectious diseases. Comparative studies of a series of children of all ages, some healthy and some ill with various diseases, failed to show this sign. It was present, however, in a case of "meningismus," in one of encephalomyelitis, in one of 5 cases of Mongolism, and in 4 infants backward in development.

A study of the relative frequency of the various signs of meningitis in 42 cases showed that the neck-sign was positive in 97 per cent., the contralateral reflex in 66 per cent., Kernig's sign in 57 per cent., and the Babinski phenomenon in 50 per cent.

He is unable to give a satisfactory explanation for the origin of this sign. It cannot be due to increased cerebral pressure alone, because it is not found in hydrocephalus. Neither can it be due to spasm, because it is absent in Little's disease. It cannot be due to pain, because it is often present in meningitis when there is no pain, and absent in normal children in whom flexion of the head seems to cause pain. He concludes that in all probability the most important factors in its production are a muscular hypertonus of the legs and a physiologic predominance of the extensor muscles of the neck and back over the flexor muscles of the legs.

Since the neck-sign was a new one and this application of the contralateral reflex also new, and since so much importance was attached to them by the various writers in the diagnosis of meningitis, it seemed to me worth while to go over the ground again in order to form my own conclusions as to their value in

this connection. I have, accordingly, examined 400 children, either well or ill with diseases other than meningitis, as to the presence of this sign. Ninety were well; 115 were suffering from diseases of the respiratory tract, including 14 cases of otitis media and 40 of lobar-pneumonia; 98 were ill with various diseases of the gastroenteric tract, either acute or chronic; 31 had various diseases of the nervous system other than meningitis and will be considered later. The remainder had a great variety of diseases—typhoid, nephritis, influenza, heart disease, rickets, purpura, scarlet fever, measles, and so on. Neither the neck-sign nor the contralateral reflex was elicited in any instance. The ages of the children varied from six days to twelve years. Ninety were less than a year old, 67 between one and two years, 102 between two and five years, and 141 over five years.

The diagnoses in the 31 patients ill with diseases of the nervous system were as follows:—

Cerebral tumor	1
Old spastic hemiplegia	1
Chronic internal hydrocephalus	3
Idiocy of various types	6
Acute anterior poliomyelitis	1
Acute cortical encephalitis	1
Diphtheritic paralysis	1
Facial paralysis	1
Chorea	2
Habit spasms	2
Epilepsy	1
Eclampsia	11

31

Five of the cases of eclampsia were examined during the convulsive state, the others in the intervals between convulsions.

It seems safe to conclude, therefore, from the study of these 400 cases, that Brudzinski and his followers are correct in their statements that neither the neck-sign nor the contralateral reflex are present in well children or in those ill with diseases other than of the nervous system, and that they are very seldom met in diseases of the nervous system outside of meningitis.

I have examined 11 cases of tuberculous, 5 of cerebrospinal and one of pneumococcus meningitis with relation to the presence of the contralateral reflex and the neck-sign. No attempt was

made to compare the frequency of these signs with that of Kernig's sign, rigidity of the neck or the condition of the knee-jerk. The ages of the patients varied from six months to eleven years. The diagnosis in the tuberculous cases was proved by autopsy in one, by the finding of tubercle bacilli in the fluid from lumbar puncture in another, and by the presence of a fibrin clot, an excess of cells and a predominance of lymphocytes in the cerebrospinal fluid in the remainder; that in the cerebrospinal and pneumococcus cases by finding the causative organism in the cerebrospinal fluid.

Tuberculous Meningitis.—Owing to the conditions under which most of the patients were seen, it was impossible to make daily examinations. Some were seen but once; in others the examinations extended over a period of several days, in one instance as long as sixteen days. They were first seen, on the average, about ten days after the onset, while, as a rule, the last examination was made on the day of death, or one or two days earlier. There was nothing constant about the results obtained. The contralateral reflex was usually absent; when present, inconstant; sometimes present on one side only, sometimes on both sides; sometimes associated with the neck-sign, sometimes not. When present it was always identical. The neck-sign was found more often, but was never constant. In one case, examined daily from the tenth day of the disease until death, on the seventeenth day, it was never found; while it was always absent in another patient studied for three days near the close of the disease. When it was present, flexion usually occurred in both legs, but sometimes in only one. The number of observations is too few to warrant any definite conclusions, but both the neck-sign and the contralateral reflex were apparently more often present about the middle of the disease than at the beginning or just before death.

Cerebrospinal Meningitis.—The contralateral reflex was never found. The neck-sign was positive much more often than in the tuberculous cases. When it was present, flexion always occurred in both legs. In three instances it was constant throughout the height of the disease. In the three patients who recovered it disappeared during convalescence, and in one of them, seen a month later, it was still absent. Another patient was taken out of the hospital while it was still present. It was absent in the fatal case on daily examinations from the fifteenth day until death, on the twenty-first day. The rigidity of the neck not infrequently prevented a satisfactory examination.

Pneumococcus Meningitis.—This patient was seen but once, the day before it died. There was paralysis of the whole right side. The contralateral reflex and the neck-sign were both present on the non-paralyzed side.

Conclusions.—The contralateral reflex and the neck-sign are never present in healthy infants and children or in those ill with diseases other than of the nervous system. They are almost never present in diseases of the nervous system outside of meningitis. The contralateral reflex is found much less constantly than the neck-sign. Both may occur intermittently or be absent throughout the whole course of the disease. Their presence in an acute disease is strong evidence in favor of meningitis; their absence does not exclude meningitis. The diagnostic value of the contralateral reflex is less than that of the neck-sign. They occur in all types of meningitis and are of no importance in differentiating between them.

THE PRINCIPAL WAYS OF TUBERCULIZATION IN THE YOUNG INFANT.—E. Terrien (*Ann. de Méd. et Chir. Inf.*, May 1, 1909) considers the various methods of entrance of tubercle bacilli into the organism of the young infant. He discards as almost negligible the theories of hereditary transmission of the germs and of the predisposition to tuberculosis. Tracheobronchial adenopathies are almost constant in tuberculosis in the child, and are a common location of early tuberculosis, whether it be brought from the respiratory organs or not. Still it cannot be regarded as a positive sign of pulmonary entrance of the bacilli. The ways of entrance of tuberculosis are multiple, including the bronchial, nasopharyngeal, and intestinal mucous membranes. The intestinal method of entrance is much more rare than has been supposed, especially since milk has been sterilized habitually, and so much care taken to get it free from tubercle bacilli. It is much more important to consider the pulmonary or nasopharyngeal entrance of germs. The principal factor is always human contagion, often in the family. To preserve the infant he must be kept from all contagion, separated from his tuberculous parents or relatives, placed in a sanatorium, if necessary, or in the country. Tuberculosis may be arrested at all stages. Latent tuberculosis progresses favorably for the infant as soon as he is removed from his surroundings to the free air and good hygiene of the country.—*American Journal of Obstetrics.*

A COMPARISON IN BOYS AND GIRLS OF HEIGHT, WEIGHT AND EPIPHYSEAL DEVELOPMENT.*

BY THOMAS MORGAN ROTCH, M.D.,

Boston, Mass.

The following remarks should not be understood to be a thorough digest of development in boys and girls, but merely the placing on record of certain observations which I have noted in my work with the Roentgen Ray on epiphyseal development.

As Professor Pryor, of Lexington, Ky., has come to the same conclusions from his work on the epiphyseal development of the two sexes, I think that at least it is worth while to present to this Society some of the practical deductions which may be made when we appreciate how, from anatomic differences in the sexes, boys and girls should be treated according to their anatomic development rather than according to their chronologic age.

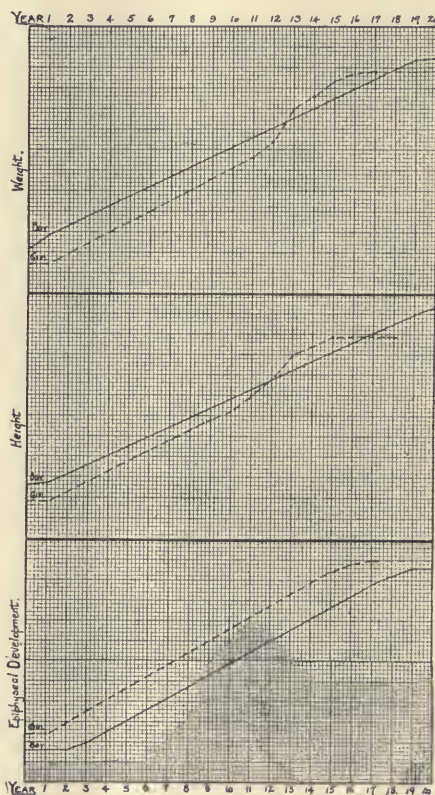
It has long been known that while boys are usually heavier and taller at birth than are girls, and that the girl, according to the zone in which she lives, overtakes in height and weight the boy of the same age at the period of puberty, and surpasses him and becomes a developed woman before the boy becomes a man, when he again overtakes and surpasses the woman. It is, of course, well known that these periods of growth vary in the individual according to race and social conditions.

These rough charts, without attempting to illustrate the finer details of height and weight in feet and pounds, merely show how the lines of weight and height cross each other at about the same time, the twelfth to thirteenth year, but these ratios apply to boys and girls living in the same territories and of the same race and social condition. These lines of weight and height are shown so well by Camerer that I have taken his charts as illustrative and to compare with my own chart of epiphyseal development. The girl's line is shown by a broken and the boy's by an unbroken line. The girl's weight line is seen to cross the boy's at about the thirteenth year in this especial set of individuals, and the boy's to again cross the girl's at about the seventeenth year. In like manner the lines of height show about the same thing, but it must be remembered that they represent individuals of like surroundings and race. The girl's line is under the boy's until about the twelfth year and then crosses it and keeps above it up to about

* Read before the Twenty-second Annual Meeting of the American Pediatric Society, Washington, D. C., May 3, 1910.

the sixteenth year, when the boy's line surpasses the girl's and remains above it.

A very large number of cases have shown that mere age does not necessarily determine weight and height, but only correlates when factors such as race, family, social condition, mode of life and climate are taken into consideration, and that these lines only



Charts showing relationship between boys and girls in regard to weight, height and epiphyseal development.

hold good under certain groupings and often do not in individual cases.

Still we can say, as a general rule, that girls are lighter and shorter at birth and that they remain so until about the age of puberty, when they surpass the boys and attain their mature weight and height some years earlier than do the boys. Boys, however, on becoming mature, again surpass the girls in height and weight.

On examining my table, made up from over 500 cases, and also on referring to hundreds of others, I found that there was a decided difference between the epiphyseal growth and that of height and weight. I shall merely refer to the fact that my Roentgen work has shown very conclusively that the development of the carpal bones and the epiphyses of the hand and wrist correlates with that of the epiphyses elsewhere, also that this development can serve as an index for classifying individuals from birth to the completion of development. Following this study it is seen that individuals fall into groups, not chronologically, but by a graded set of developmental epiphyses.

Now if we examine this index still more carefully we will find that not only the groups which correspond in epiphyseal development differ quite widely in age, but that it is very apparent that the epiphyseal development of girls is in advance of that of boys from the very first year of life and remains ahead up to the time when the epiphysis, for instance that of the radius, becomes fully united. This unification, according to Pryor, takes place at about the sixteenth to the seventeenth year in girls and about two years later in boys. This means that the girl becomes a mature woman anatomically earlier than the boy becomes a mature man. My lines show this priority of the epiphyseal development in the girl over the boy from the first year of life, and are in striking contrast to the lines of weight and height.

These charts enunciate strongly the lack of correlation between epiphyseal growth and general physical development. When also we consider how often the epiphyseal growth seems to have a certain bearing, almost of correlation, on the mental growth, we can perhaps explain certain mental characteristics of girls as compared with boys. This again leads us on to the idea which I have expressed in previous papers, that in grading individuals from birth to the completion of development, the epiphyseal development should play a prominent part and should replace a chronologic grading; also that the child's general welfare depends to a certain degree on keeping its mental and epiphyseal development in equilibrium, thus avoiding overstrain, both mental and physical. This also leads up to the possibility that in grading the two sexes we should either have a separate curriculum for the sexes or a curriculum adapted to certain stages of epiphyseal development.

A STUDY OF THE STOMACH CONTENTS AND MOTILITY IN BREAST- AND BOTTLE-FED INFANTS.*

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In contrast to the fairly uniform results derived from the study of the gastric functions of the adult is the marked lack of uniformity of the data obtained from the investigation of the digestive functions of the stomach of infants. This striking fact is not attributable to lack of careful investigations, but in part to the employment by successive investigators of a number of different chemical methods of varying degree of accuracy; in part to the inability of employing certain valuable methods of study which, though harmless for the adult, are inapplicable for the delicate organism of the infant, but in greater part to the well-known physiologic variations of the digestive functions at this period of life.

Although Kussmaul invented the stomach tube in 1867, it was not until 1880 that this invaluable instrument was first used in infants and children. In that year Epstein demonstrated the entire harmlessness of the introduction of the tube into the stomach of even very young babies, and called attention to the value of its application in the treatment of gastric diseases of infancy and childhood. Though he did not primarily employ the stomach tube for diagnostic purposes, he did incidentally find that the stomach in very young normal infants was empty after one to one and one-half hours. The first use of the stomach tube for scientific investigation was made in 1887 by Raudnitz, who determined the presence of rennet in the gastric contents of three infants from two to six months of age. In four other infants in the first week of life he was unable to find rennet. Since 1887 almost every year has brought forth important contributions to the subject of gastric digestion in infancy. The literature to date is so voluminous that I shall of necessity mention only the most important papers. I shall refer in some detail to the papers of

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Leo in 1888, Von Puteren 1889, Heubner 1890, Pipping 1891, Pfannenstill 1892, Czerny 1893, Von Hecker 1900, Meyer 1903, Hamburger and Sperk 1905, Langstein 1905, Sedgwick 1906, Rosenstern 1908, and Reeve-Ramsey 1908.

The first important and classic paper was that of Leo, who examined 30 normal infants from the age of two hours to twelve months, and 104 infants suffering from various gastrointestinal diseases. In the normal breast-fed infants he found that the stomach emptied itself in about one and one-half to two hours, and during the first week of life in one hour. In artificially-fed infants and in the older children of the series the food remained longer in the stomach. The total acidity was higher in the artificially-fed infants and its percentage increased with the duration of gastric digestion, but even in these cases no free HCl was found until after one hour. This author first called attention to the importance of the "combining power" of milk with HCl. This fact accounts for the non-appearance of free HCl until after complete saturation of the milk. He determined the presence of pepsin in all the cases and found in contrast to that of Raudnitz that rennet was present even in the newborn. His finding of a diminished number of bacteria in the gastric contents, as contrasted with the number originally in the food before ingestion, led him to attribute great importance to the antifermentative (bactericidal) properties of the gastric juice.

This bactericidal action of the gastric juice could not be confirmed by Von Puteren, who examined 248 infants, all below six weeks of age. This investigator not infrequently found food in the stomach after two hours, at which time free HCl was almost always present. The total acidity in his cases varied from .03 per cent. after ten minutes to .08 per cent. after ninety minutes, which was the maximum. During the first four weeks of life he was unable to demonstrate the presence of rennet.

Heubner, in 1890, reported on about 40 infants, the ages varying from two weeks to fifteen months. He made special studies on the presence of lactic and volatile acids and found lactic acid present in 4 breast-fed infants and in 9 infants fed on cow's milk. Volatile acids were found by him in 5 out of the 26 artificially-fed babies.

Pipping, who examined 29 normal infants under three months of age, found that the stomach emptied itself in about two hours. He confirmed Heubner's results in demonstrating lactic acid more

frequently in artificially-fed infants. While butyric acid was never present in the breast-fed, in the infants fed on cow's milk this acid was constantly present.

Czerny again drew attention to the "combining power" of milk with HCl. He found that cow's milk takes up more HCl than does human milk. In order to retain the bactericidal properties of the gastric juice which is due to free HCl, he urged the advisability of longer intervals between feedings, especially when cow's milk is used. This author also found that whereas the stomach of a young infant is empty after an interval of two hours, when several feedings are given in rapid succession, considerable remains of the last meal may be found even after three or four hours. This fact in his opinion also speaks for the advisability of lengthening the feeding intervals.

Pfannenstill first employed the salol test for the determination of the time required for food to pass into the intestines. He administered salol and examined the urine, obtained by means of a catheter kept in the bladder during the entire period of examination, at intervals of five minutes. In 60 healthy children he found that the ferric chlorid reaction appeared in the urine from forty to sixty minutes after ingestion of food mixed with salol.

Von Hecker, employing the same method as Pfannenstill, found that the time of appearance of the ferric chlorid reaction varied with the age of the child. The younger the child the earlier the reaction appeared.

Meyer discarded the use of milk for most of his investigations and employed barley water and occasionally sterilized water or physiological salt solution as a test meal. He claims that with these media organic acids do not appear, and that the presence of HCl in its free and combined state is thus more readily determined. With this test meal he found in 17 artificially-fed children the stomach empty after one to one and one-third hours. While in most cases the total acidity increased with the duration of gastric digestion, this was by no means constant. He attributes the occurrence of these variations to at present unknown nervous influences.

Hainburger and Sperk made an extensive investigation on 63 normal breast-fed infants. They found no free HCl until after one hour and no lactic acid at any time. They attribute considerable theoretical and some practical importance to the so-called HCl deficiency, which is determined by adding a decinormal HCl

solution to the gastric contents to the point where free acid becomes demonstrable. They made the interesting observation that the "combining power" of the gastric contents (as measured by the total acidity plus HCl deficiency) was greater than that of an equal amount of milk, before it was taken into the stomach. While the explanation for this unexpected phenomenon is not entirely clear, the authors think that it is probably due to the secretion into the stomach of acid salts, weak organic and fatty acids.

Langstein made careful chemical investigations on the protein digestion in infants and came to the conclusion that peptones were the result of the action of pepsin exclusively, and that rennet played no part in this process.

Sedgwick found that a fat splitting ferment occurs in the infant's stomach as early as the second week of life, and that a part of the acidity of the gastric contents may be due to the action of this ferment.

Rosenstern employed the ricin method for the quantitative estimation of pepsin in the gastric juice. His results showed that the quantity of pepsin secreted increases during the first four months of life and that after this period it remains constant, and that artificially-fed infants secrete more pepsin than breast-fed infants of the same age.

Reeve-Ramsey, employing the edestin method for his investigation, found that pepsin is always present in the normal breast-fed infant, and that this ferment in the gastric juice can split up protein into peptones without the addition of acids; and that hydrochloric and lactic acid and pepsin are not necessarily always present at the same time. From a survey of the literature mentioned it can readily be seen what radical differences of opinion exist among investigators as regards practically all the important functions of the infant stomach.

The present investigation was not undertaken with the idea of solving the many mooted questions in this field of the physiology of the infant, but for the purpose of adding another series of data to American literature, which up to the present time has not been very prolific in investigations on the gastric digestion of infants.

The cases studied were divided into two groups. The first group included 20 normal infants from three to seven days old, born at the New York Lying-in Hospital. The second group comprised 13 artificially-fed infants from six weeks to seven

months of age, all convalescent from various acute diseases, for which they were admitted to the children's service of Dr. Koplik, at the Mount Sinai Hospital of New York City. In all these cases the temperature had been normal for at least a week and the general condition good, so that for our purposes they may all be considered to have been at the time practically normal infants.

The method of procedure with the newborn infants was as follows: Where practicable, that is in the majority of the cases, the baby was weighed before and after nursing, so that the quantity of milk taken could be accurately determined. At the end of one-half and one hour respectively, on alternate days, the stomach contents were removed by means of a No. 18 (Fr.) Nélaton catheter. The introduction was readily performed while the child lay on its back and was well borne by all the infants; some of them continuing to sleep during the greater part of the procedure. In most of the cases the gastric contents were more readily obtained when the infants began to cry or gag. At the end of the procedure an aspirating bulb was attached to the stomach tube, but in no case could more contents be thus obtained. No water was introduced into the stomach for the purpose of ascertaining that it was completely empty, nor was preliminary gastric lavage undertaken. Change of position, or even inversion, had no marked influence on the quantity of contents obtained from the stomach. The chemical methods used were the same as those for the older bottle-fed infants and will be described later.

In the second group four examinations were made for each individual case, namely, at the end of one-half, one, two and three hours respectively, on alternate days. In a few cases the stomach tube was introduced at the end of four hours, but in only one were contents obtainable. No greater difficulty was encountered with the older infants than with the newborn in the removal of the gastric contents. No preliminary gastric lavage was undertaken, as it was found impracticable to do so. The contents were received in a glass jar, then measured in a graduate. If the volume was less than 20 c.c. an equal amount of distilled water was added and the calculations made accordingly. After ascertaining the volume the contents were poured on a filter. The filtrate was then used for the following determination:—

Total Acidity.—5 c.c. were titrated with $N/10$ NaOH solution, phenolphthalein being the indicator.

Free HCl was determined by Congo paper and phloroglucin-vanillin. When the reaction was positive 5 c.c. were then titrated with Töpfer's reagent.

Pepsin.—5 c.c. of stomach contents were added to a Mett's tube 1 c.c. long, then placed in a thermostat over night and the amount of digestion noted.

Rennet.—5 c.c. of fresh milk were added to 5 c.c. of gastric contents, then placed in a thermostat and observed at intervals of twenty minutes for one hour for curd formation.

Lactic Acid.—To the remaining amount of stomach contents were added 10 drops of H_2SO_4 , then put into a separator and shaken with equal volume of ether; the water layer was then run off and the ethereal solution filtered; to this filtrate was then added a very dilute solution of $Fe_2 Cl_6$ and shaken in a flask. In presence of lactic acid the H_2O solution turns canary yellow.

A microscopic examination of the sediment of the gastric contents before filtration was made in a number of cases, and practically nothing but fat globules and starch granules were seen.

I shall now proceed to a discussion of the principal finding in each of the two groups.

In the first group there were 20 newborn infants and 36 specimens of gastric contents were examined. Of the 20 infants 1 was three days old, 1 four days, 2 six days, 1 seven days, and 15 five days old. The quantity of milk consumed at each feeding, as measured by the weight of the infant before and after nursing, varied from 30 to 200 grams, the average being about 100 grams, a quantity which is considerably above the figure which has been assumed to be normal at this time of life. The quantities recovered at the end of one-half hour varied from nothing to 60 c.c., the average quantity being 25 c.c. There was apparently no relationship between the quantities consumed and the quantities recovered. At the end of one hour the figures varied from 4 c.c. to 45 c.c., the average for the 16 cases examined being 24.3 c.c. In several instances, as can be readily seen from the table, the amount obtained at the end of one hour was greater than that at the end of one-half hour (in the same infant). In 5 additional cases, in which the stomach tube was introduced from two hours and fifteen minutes to two hours and thirty minutes after nursing, about $\frac{1}{2}$ to 3 c.c. of fluid containing a few curds was removed.

The *total acidity* at the end of one-half hour varied from 10 to 112, the average being 31.2.

In the 16 cases in which the contents were removed at the end of one hour the total acidity varied from 12 to 60, the average being 29.2. These findings are not in accord with those reported by most observers, who found a progressive increase in acidity during the course of gastric digestion.

Free HCl was found in none of the cases.

Pepsin.—Without the addition of HCl no peptic action (Mett's tube) could be determined in any of the cases. When one drop of a 2 per cent. HCl solution was added to the gastric contents the presence of pepsin could be demonstrated in all but 4, and even in these pepsin was present in the contents removed at the end of one hour. In general, the peptic action was more marked in the one hour than in the one-half hour contents.

Rennet.—In the one-half hour contents there were 7 specimens out of 20, or 35 per cent., in which no rennet was found. In the one hour cases there were 8 out of 16, or 50 per cent. negative specimens. In this connection I wish to call attention to the fact that the latest researches of Pawlow and Jacoby seem to indicate that rennet is not a special ferment, but that the curdling of milk is due to the action of all proteolytic ferments, which split up caseinogen into a substance which combines with calcium salts to form the curd.

Lactic acid was present in 10 specimens. It was marked in 3 cases, moderate in 2, and faint in 5 cases. In general, it was more often found in the one hour than in the one-half hour contents.

In the *second group* (the bottle-fed babies) there were 13 cases and 39 specimens of gastric contents were examined. The ages varied from six weeks to eleven months. The quantities recovered after one-half hour varied from 4 to 146 c.c.

At the end of one hour the stomach was empty in 1 case (six months old; quantity of feeding, 90 c.c.). The maximum quantity of contents obtained was 103 c.c. (this child being five months old; quantity of feeding, 180 c.c.). At the end of two hours the stomach was empty in 4 cases and the maximum quantity recovered was 60 c.c. (in 2 children, one seven months and the other eleven months old; quantity of feeding in each case, 240 c.c.). At the end of three hours the stomach was empty in

5 cases and the maximum quantity of contents was 35 c.c. (in a child eleven months old, who took 240 c.c. at a feeding). On a subsequent examination the same child yielded 40 c.c. at the end of four hours. In 7 other cases nothing was obtained at the end of four hours.

Total Acidity.—In the one-half hour specimens it varied from 10 to 36, the average being 22.3. In the one hour specimens it varied from 3.75 to 41.4, the average being 28.7. In the two hour specimens it varied from 4 to 70, the average being 44. In the three hour specimens there were three examinations. One case showed an acidity of 8, a second specimen an acidity of 54, and a third an acidity of 75.

Free HCl was present in but 2 cases. In one case it was 12.4 after two hours, in the other case it was 4 after one-half hour, 31 after two hours and 38 after three hours.

Pepsin was present in 6 cases; in these it was not found necessary to add HCl to develop its proteolytic action.

Rennet was present in all but 2 cases.

Lactic acid was present in 3 cases; in 1 at the end of one-half hour, and in 2 at the end of one hour.

CONCLUSIONS.

Fully recognizing the fact that no important conclusion should be drawn from the examination of but a small number of cases, yet I may be permitted to call attention to a few interesting results which are brought out by the present study.

The Newborn Infant.

(1) The large amount of milk taken at one nursing by many of the newborn infants.

(2) The fact that practically the same quantity of gastric contents was obtained at the end of one hour as at the end of one-half hour, and that at the end of two to two and one-half hours $\frac{1}{2}$ to 3 c.c. could still be recovered.

(3) The fact that the total acidity was practically the same at the end of one hour as at the end of one-half hour.

(4) The absence of free HCl in all the cases.

(5) The demonstration of pepsin on addition of HCl in all of the one hour specimens and in all but 4 of the one-half hour specimens.

(6) The presence of rennet in two-thirds of the cases.

(7) The presence of lactic acid in one-half of the cases.

Bottle-fed Infants.

(1) The stomach was found empty at the end of two hours in 4 out of 13 cases, and in 5 out of 9 cases at the end of three hours, and in 5 out of 6 cases at the end of four hours.

(2) In contrast to the breast-fed infants, in this group there was a noticeable increase in the total acidity from one-half to three hours in most of the cases.

(3) The presence of free HCl in 2 cases, seven and eight months of age, respectively.

(4) Pepsin was present in only 6 cases.

(5) Rennet was demonstrated in all but 2 cases.

(6) Lactic acid was present in all but 3 cases.

These data differ in many respects considerably from those recorded in previous studies. One cannot escape the impression of the noticeable lack of uniformity in the results yielded by most of the previous investigations, and of the lack of standards available for clinical purposes. It remains for future studies to place the clinical value of gastric analysis of the infant on as firm a basis as is that of the adult.

I take this opportunity of thanking Dr. Koplik for his encouragements, suggestions and material, also Dr. Asa B. Davis and Dr. R. W. Lobenstine for the use of their material at the New York Lying-in Hospital; Dr. S. Bookman for the examination of the gastric contents of the bottle-fed infants at the Physiological-Chemical Laboratory of the Mt. Sinai Hospital, New York City.

I am especially indebted to Dr. M. H. Kahn, interne at the Mt. Sinai Hospital, whose aid in connection with the examination of the cases has been of the greatest value during the whole course of study.

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SOME PROBLEMS OF NUTRITION IN EARLY LIFE.*

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PART III.

While it is not the purpose of this paper to discuss the pathology of nutrition, nevertheless I should feel guilty of neglect did I not touch upon certain new views concerning nutritional disturbance, which are daily gaining wider acceptance and which are so revolutionary and yet, if true, of such great significance, that they must be taken into careful consideration by all who are interested in the feeding of children.

They deal with the unity of a multitude of disorders of alimentation, which have heretofore been referred to as many causes, including the dyspepsias, atrophies, and some febrile conditions usually deemed to be due to bacterial infection. The impulse to this unification is due largely to the work of Czerny and Keller, but more elaborately formulated and advocated by Finkelstein, of Berlin.†

In this brief summary I will stick close to Finkelstein's text. He says: "Under the influence of an unsuitable food, such as for many children cow's milk and preparations of cow's milk exhibits, there is developed a disturbance of nutrition (*Ernährungsstörung*) the essence of which consists in a material deterioration of the physical condition in general and of the cells entrusted with the task of nutrition in particular. The consequence of this food injury‡ is a weakening of the functions of nutrition, the most decided symptom of which is a diminution of tolerance for food, a narrowing of the field of tolerance. Upon this foundation the physiologic reaction to an increase of food changes into a morbid, paradoxical one, which deviates from the norm the more the food injury advances."

* The Jerome Cochran Lecture, read before the Medical Association of the State of Alabama, April 20, 1910.

† "Ueber alimentäre Intoxication im Säuglingsalter," *Jahrbuch für Kinderheilkunde*, 1907, Vol. LXV., pp. 1-15.

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‡ Term introduced by Czerny and Keller.

He divides this disturbance of nutrition into four stages, the first of which he designates as a "disturbance of balance" (*Bilanzstörung*).

To quote him further: "In the beginning of this process, which includes all those conditions which heretofore have fallen under the conception of 'atrophy,' the patient loses only the capacity to utilize in the same complete manner as the healthy child his food for maintenance and increase of his tissues while he is still in a condition to avoid loss or catastrophe. It amounts merely to an inferior result of the processes of nutrition, to a disturbance of balance."

To the observant eye of the clinician the child may show the lesser signs of impaired nutrition, the stools may take on the character of the soap stools, but not necessarily; the temperature has a little greater excursion, with an average slightly below or above normal, but the one decided manifestation of its condition is what Finkelstein calls the "paradoxical reaction," namely, a failure to gain materially, or at all, on an increase of food that would meet with such a response from a healthy child. In the more advanced stages this paradoxical reaction is expressed by loss of weight or even fatal catastrophes.

The keynote of this stage, then, is a lowering of tolerance to quantitative or qualitative increase in food.

This disturbance is attributed to the fat in the food. The proteid is considered absolutely innocent. Such children respond to fat-poor and carbohydrate-rich food. Gradually, however, they may suffer a carbohydrate intolerance.

To mother's milk the response is favorable in all.

I am sure that as we hark back this paradoxical reaction recurs many times in the experience of all of us; the child who will not gain on the food that seems sufficient and who seems to handle it well and to whom we have been tempted to give ever-increasing quantities, until it exceeds what our common sense tells us is proper and then the gastrointestinal disturbances or other morbid manifestation and the long, hard battle.

To quote Finkelstein further: "In this condition (disturbance of balance—*Bilanzstörung*) the child remains, until one day—again under the influence of unsuitable food—the signs of a more severe local disturbance of the gastrointestinal canal are appreciable. Now the child has entered the dyspeptic stage."

This stage of dyspepsia shows all the characteristics of the

first stage, with the addition of the local manifestations. The resistance to bacterial action is lowered and we have fermentation processes with a reaction of the mucous membrane to them, such as in milder cases we are accustomed to call dyspepsia and in more severe designate as gastroenteritis. It is really a transitional stage, which, if not appreciated, or if disregarded, passes over into the third or fourth stage.

It may be due to fat, as explained, for the first stage, and can be successfully met by a fat-free diet; or may be due to excessive carbohydrates and relieved by lowering this constituent of the milk and dilution. This explains the success of the fat-free, sugar-poor buttermilk.

Again, it must be appreciated that tolerance for all kinds of sugars are not the same and that a child intolerant of milk sugar or cane sugar may still gain on malt sugar or dextrin-containing mixtures; hence the success in some cases that follows the use of the so-called malt soups.

With the sugar intolerance the dyspepsia is much more likely to be accompanied by fever.

In this stage, too, the child is rapidly responsive to woman's milk.

If favorable influences are not brought to bear at this time there "begins in ever more emphatic manner, in addition to the local disturbances, general ones. There starts that mysterious change in the character of the heretofore stable body, which exhibits a reversal in the complete sense of the word of the processes of nutrition. Instead of the body gaining energy and substance from the food, the food consumes the body. Through the addition of food an uninterrupted emaciation of the body sets in and advances the more rapidly the more one endeavors to call a halt by abundant supply."

Finkelstein adds that it is apparent that this loss is not due to that of water and fat, but that a substance of important biologic significance is ravaged from the body, which accounts for the steady diminution of the powers of assimilation that accompany the emaciation. When this condition obtains the child has entered upon the stage of alimentary decomposition.

You will see how these views play havoc with our old ideas of gastroenteritis as a bacterial infection and how it accounts for the rapid disappearance of these infections under the reduced diet to which we submit them. The tremendous importance of these

newer teachings, if time shall set them on a sure foundation, needs no elaboration.

This stage of decomposition, with its decided and continuous loss of body weight, is what we have termed "atrophy," and in its later stages recognized as "marasmus."

The symptoms of this stage are too familiar to us all to require repeating.

Here the field of tolerance is much more limited. The stage of disturbance of balance, in which the administration of fat induced a standstill in weight, displayed no intolerance for sugar and under increased carbohydrates a gain in weight could be attained. Now, in the stage of decomposition an ever-increasing intolerance for sugar as well as fat is established.

In the beginning of this stage sugar may still obtain gain, while fat causes not a standstill, but loss. Later, fat causes loss and sugar a standstill. Finally, both fat and sugar cause a loss.

In the early stages a cutting down of the food may so much improve the tolerance that by careful feeding the infant may be made to gain even on artificial feeding. A little later we are between a veritable Scylla and Charybdis. Any increase of food will surely increase the loss of weight, while the amount tolerated supplies insufficient calories for daily use and in turn determines a loss.

At this point only mother's milk can redeem a case. In the later stages even mother's milk fails to turn the scale, for the child has developed an intolerance toward the fat and sugar in it, and a fatal issue is unavoidable.

Science has furnished us with these beacons, but to bring our bark safe to port over these troubled waters is an art, and art is the fruit of experience.

The fourth stage, or, more appropriately, the fourth symptom-complex, is called by Finkelstein "Alimentary Intoxication." This may occur during any stage, or even when previous disturbance has been so slight as to escape attention.

The first hint of the condition is a rise of temperature—"alimentary fever."

When fully developed the complex embraces nine symptoms, as follows: (1) Disturbance of consciousness, such as somnolence, stupor, coma or wild excitation; (2) a peculiar change in the type of respiration, which is exaggerated, deepened, uninterrupted and somewhat hastened; (3) alimentary glycosuria; (4) fever; (5) collapse; (6) diarrhea; (7) albuminuria and

cylindruria; (8) loss of weight; (9) leukocytosis, as a rule under 30,000. Only a portion of the cases come to a full development.

Transitional stages are commonly seen. After the fever comes a marked loss of weight, usually with diarrhea, and then other signs of the intoxication.

The different degrees of intoxication cover what are usually termed dyspepsia, acute enterocataarrh, enterocolitis and, in a severe type, cholera infantum.

Sugar is always the factor in the food causing fever. It must promptly be cut down or excluded.

In advanced stages of decomposition it occurs on breast milk.

Intoxication occurs only when there is an insufficiency of nutritional functions, which obtains in decomposition or its preliminary stages. To quote Finkelstein further: "Intoxication in all its degrees, from alimentary fever to the typical poisoning, is nothing more than the paradoxical reaction of a child affected by the process of decomposition, to a constituent of the food in amounts exceeding tolerance and which possesses the capacity of toxic action. This reaction is possible just as soon as, under the action of the process of decomposition, the child enters the preliminary stage of dyspepsia, and it requires for its production smaller amounts the further it has advanced in the peculiar decomposition."

For the production of intoxication there must be an injury to the digestive tract, such as occurs in the stage of dyspepsia and does not yet obtain in the stage of disturbance of balance.

Sugar may produce (1) fermentation alone, or (2) fermentation and decomposition; that is, loss of weight; or (3) fermentation, fever and intoxication; and which of these depends on the amount of sugar and on the degree of decomposition; so that in the administration of sugar we have a diagnostic measure of significance to determine the degree of decomposition by the reaction in terms of intoxication.

The induction of intoxication by fat is due to the intensification of decomposition, and so the susceptibility to the intoxication by sugar; so that fat operates in the direction of intoxication only indirectly. "The fat exerts an injurious action upon the sugar-assimilating function, so that by the addition of fat not so much sugar can be normally worked up as before. Clinically, this process expresses itself as a lowering of sugar tolerance."

Intoxication is due to a foreign substance (sugar) derived from the food, circulating in the blood, and the phenomena abate with its disappearance.

Decomposition is not due to absorption of injurious substances, but to a loss to the tissues of constituents the body cannot spare.

Intoxication is a specific reaction to a certain kind of diminished tolerance. Decomposition is the "diminished tolerance" itself and determines the possibility of all forms and grades of the "paradoxical reaction."

These views of Finkelstein are receiving wide acceptance, but just why and how fat and sugar bring about these changes in the processes of nutrition is at the present moment the subject of much investigation.

Meyer,* in an excellent article reviewing our knowledge of the part played by salts in metabolism, believes that it is through these substances that fat and sugar exert their deleterious influences; that the formation of soap stools under fat and of fatty acids under carbohydrates, which may increase fivefold over normal, diverts the salts for their neutralization and so robs the tissues. When the decomposition sets in the mineral balance is negative and the loss of weight more marked, because to obtain salts enough for vital purposes they are withdrawn from the tissues, which are dissolved or disintegrated by the process. He sums up by saying that it appears as if the salt composition of woman's milk guaranteed the proper course of assimilation and fate (disassimilation) of food, while it happened more readily by the introduction of food into the menstrium of ash of cow's milk that the breakdown of food was led along false paths (fatty acid formation) and at the same time the bacteria-regulating power of the intestinal epithelium was lost.

He elaborates his views of the part played by the salts in the more recent article referred to,† calling attention to the numerous functions they subserve, affording building material for new cells, affecting nerve excitability and muscle contraction, influencing temperature and pulse, weight, water retention and other processes.

He shows how some of these effects are due not to the salt itself, but to their ions; for example, that the storage of water is

* Meyer, "Ernährungsstörungen und Salzstoffwechsel beim Saeugling," *Ergebnisse der Inneren Medizin und Kinderheilkunde*, Erster Band.

† *Jahrbuch für Kinderheilkunde*, Vol. I., p. 71.

a function of the kation sodium, made stronger or weaker through the addition of different anions.

That sodium chlorid in physiologic solution, given subcutaneously, can produce fever was first shown by Schaps, a pupil of Finkelstein.

Later it was shown that sodium chlorid given by the mouth could, under certain circumstances, produce an elevation of temperature. This, too, can be shown to be due largely to the kation sodium. The potassium ion may or may not elevate the temperature, while the calcium ion reduces it.

In disturbance of balance fat stools occur and calcium and magnesium increase in the stools; but the calcium and magnesium alone cannot explain the loss of weight, and it is probable that there is a diminution in the retention of other salts, so that the building material of new body substance is insufficient and growth is limited.

In decomposition the loss of alkalies is predominant, not only on fat-rich food, but upon sugar as well. The loss of alkali is due to the neutralization of fatty acids.

Perhaps there is a disturbance of the correlation of salts in the organism which may be of significance.

Just as an increase of sodium chlorid causes an increase of temperature, so its loss may explain the low temperature of this condition.

The absorption of sodium chlorid is assumed to account for the fever of intoxication. It is supposed that in sick children the amounts that will produce pyrexia are less than in healthy children. Moreover, it is premised that the tolerance toward salt solutions is lowered through some alteration in the intestinal epithelium brought about by the injurious action of the fatty acids.

Careful histologic examinations of the intestinal epithelium have been made to determine such lesions,* but the results have been negative where sufficient precautions have been taken to exclude the rapidly occurring postmortem changes, so that Reika's conclusions seem fair when he says that "food injuries of infants, even severe alimentary intoxications, can run their course without a microscopically demonstrable lesion of the intestinal epithelium."

* "Beiträge zur Pathologischen Anatomie der Paedatrophie (Dekomposition)," Helmholz, *Jahrbuch für Kinderheilkunde*, Vol. IV., p. 70.

"Histologisch Untersuchungen des Darmes von Säuglingen," *Jahrbuch für Kinderheilkunde*, Vol. V., p. 70.

THE PLANTAR REFLEX IN INFANCY AND CHILDHOOD, WITH SPECIAL REFERENCE TO THE VALUE OF THE BABINSKI PHENOMENON DURING THIS PERIOD.

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Any one who has made a routine examination of a large number of infants and children, and who has included in his examination the plantar reflex, will have been struck with the very great variability of the phenomenon during infancy and childhood.

It was with a view of determining, if possible, the exact status of the reflex, and of the value of the Babinski phenomenon during this period of life, that a series of 500 infants and children was examined.

In 1896 Babinski first published his monograph on the symptom that was to bear his name, and said that if in eliciting the plantar reflex, extension of the toes, especially the great toe, occurred upon the metatarsus, this extension was pathognomonic of a lesion of the pyramidal tract. He made, however, these exceptions: (1) In newly born infants the so-called infantile response was constant. (2) In cases of complete transverse lesions one would be unable to elicit any plantar reflex. As is so often one's experience in investigating a problem, when the literature bearing upon the subject of the plantar reflex in infancy and childhood was investigated, a most comprehensive article was found written in 1899 by Collier, of England. He describes very fully the normal plantar reflex in adults, the normal reflex in infants and the Babinski reflex, and one cannot do better than quote his words exactly on the subject:—

“I. *The Normal Plantar Reflex in Adults.*

“1. Minimal stimulus causes contraction of the tensor vaginæ femoris, often accompanied by a less marked contraction of the adductors of the thigh and the sartorius.

“2. With slightly stronger stimulation there occurs flexion of the four outer toes, the movement preponderating toward the little toe.

"3. With still stronger stimuli all of the toes are flexed on the metatarsus and adducted.

"4. Later the ankle is dorsiflexed and the foot is inverted by the tibialis posticus and the flexors of the knee.

"II. *The Normal Reflex in Infants.*

"1. The response is brisk.

"2. The great toe is drawn back.

"3. There is an extension and spreading out of all the toes with inversion of the foot and dorsiflexion of the ankle.

"4. Later there is flexion of the hip and knee.

"5. Finally, with strong stimuli there is a general irregular movement of the hip and trunk. It differs from the adult type in the widely extended abducted toes in contrast to the flexed adducted toes and in the late response of the hip muscles. The infantile reflex changes when walking begins, *i.e.*, continues in healthy infants up to the end of the first or second year. In weak children up to the end of the fourth year. It is occasionally found up to the sixth and twelfth year, if the child is asleep, but changes to the adult type if the child is awakened.

"III. *The Babinski Phenomenon.*

"1. The great toe makes the greatest and sometimes only movement.

"2. The movement is one of extension and abduction, the latter most marked in the smaller toes.

"3. The extension especially well marked in the great toe is slower than normal flexion and gives rise to the impression of deliberation."

In view of the lax way in which the Babinski phenomenon is usually described in the courses in nervous diseases and even in many of the text-books, the value of an exact description such as Collier gives cannot be overestimated. Babinski, in his own description of the symptoms, called attention to the fact that (1) extension in a diseased process is much slower than flexion with a normal cord, (2) flexion is stronger in healthy subjects when the inner side of the Plantar surface is stimulated, whereas the extension is more marked when the outer side of the sole is stroked.

Collier appends to his article a very valuable chart, comparing the adult, infantile and Babinski plantar reflex.

	Adult.	Infantile.	Babinski.
Movement,	Quick	Deliberate	Quick
Muscles first to contract with a minimal stimulation,	Tensor Vaginæ Femoris	Extensor Proprius Hallucis	Extensor of toes
Position of toes,	Flexion Adduction	Extension Abduction	Extension Abduction
Obtained more easily by stimulating,	Inner part of the sole	Outer part of the sole	
Movement of ankle,	Dorsiflexion inversion both conspicuous	Dorsiflexion inversion both conspicuous	Dorsiflexion eversion both conspicuous

To show the uncertainty of the knowledge of the plantar reflex in infancy it will be well to quote from Schüller, who says that the plantar reflex in children is absent or unsatisfactory, and Cohn, who says that the plantar reflex is generally absent in children, but when present is usually extension.

With this brief résumé of some of the best literature on the subject, it will occur to one that the impression gleaned from the experience of different observers has been very variable, and with this in mind the series of cases was investigated, and the conclusions drawn without the result being especially biased by previous observations of others.

The technique employed was as follows: With as little disturbance to the child as possible (and in the latter part of this paper attention will be called to the special importance of this point) the shoes and stockings were removed, and, with the baby in the recumbent position, the sole of the foot was stroked alternately from before backward and behind forward. To determine if possible the bearing that the priority of stimulation had on the result, in one case the external border of the sole was stroked first, and in the next case the internal border. Little attention was paid to the effect produced, except in regard to the part played by the toes. This plan was followed for two reasons. In the first place the practical conclusions to be drawn from the examinations pertained especially to the toes, and in the second place it was found, after a few examinations had been made, that it was practically impossible to so regulate the degree of stimula-

tion that one could be sure just where the first effect was noted. In a general way, however, it was attempted to elicit the plantar reflex with the slightest stimulation.

For the purpose of noting the results obtained the cases have been divided into groups according to age, the first group including all the babies from birth to five months of age. Note was made in all of the cases as to whether the babies could or could not stand or walk, and, of course, in this group of cases all the babies were unable to stand.

One hundred and sixty babies were examined, and in 147 of these the following observation was made. All of the toes were extended, the reaction was very quick, the large toe responded more briskly than the others. Abduction likewise occurred at the same time as extension.

Of the remaining 13 babies of this age, 7 failed to respond in the least to the stimulation, and all of these were found to have very cold feet. The result in the remaining 6 was very variable, without anything in the physical condition of the babies, as far as could be determined, to account for it.

It is, however, worth noting that 2 of these 13 showed a flexion of the toes, especially the smaller ones, when the inner border of the sole was stimulated, and an extension of the toes, especially the great one, when the outer edge was stroked.

In the second group of children were included all of the babies up to the ninth month.

Sixty-two children were included in the group, and only 5 of them were able to stand; none was able to walk. All of those who could stand showed on stimulating the outer side of the plantar surface extension and abduction of the toes, especially the four smaller ones. Of the 57 who could not stand, 47 gave the reaction that was observed in the younger babies. Extension and abduction of the toes, especially the larger one, when either the outer or inner side of the sole was stimulated. The other 10, all of whom were over six months of age, gave variable results. Three showed no response because the feet were very cold. Two showed flexion on stimulation of the inner side of foot, extension on stimulation of the outer side of the foot. The remaining 2, and it was noted that they were very well developed, responded with flexion of the toes when either the outer or inner side of the plantar surface was stimulated.

In the third group of babies were included all up to the age of

one year, and 55 babies were examined. Twenty-eight of them could not stand; of these 28, 24 gave the characteristic infantile response. Of the remaining 27, 2 could walk, and these gave extension on external stimulation and flexion on internal stimulation. Fifteen of the remaining 25 who could stand gave the same reaction. Three well-developed children responded with flexion of the toes when either side was stimulated. The remaining 7 showed extension of the toes when either side was stimulated, but it was noted in 3 of those 7 the extension of the toes was much slower and less pronounced when the inner side of the foot was stimulated than when the outer side was stroked.

The fourth group of cases included 67 children between the ages of one and two years, and 18 of these were not able to stand. Only 8 of these 18 showed the usual infantile reflex, the remaining 10 showing extension and abduction of the toes when the outer side of the sole was stroked and flexion and adduction on internal stimulation. Of those who were able to stand, but not walk, 18 in number, 16 gave what we might call the double reaction, only 2 gave the characteristic infantile reflex, and these were very rachitic, and one well-developed baby showed the adult reflex. Of the 34 babies who could walk, 17 showed the characteristic adult reflex, 15 showed extension on external and flexion on internal stimulation. It is extremely interesting to note that 2 babies in this group who had been in the reclining position for weeks and as the result of illness were unable to walk, having walked previous to it, when examined showed the characteristic infantile reflex. This naturally suggests to one the possibility of a similar change in the plantar reflex in adults who have suffered for a long time from some wasting illness.

In the fifth group of cases were included 103 children between the ages of two and five. All of them were able to walk. Fifty-four showed the characteristic adult phenomenon flexion and adduction most marked in the smaller toes. Thirty-eight responded with extension and abduction on external stimulation and flexion and adduction on internal stimulation. Five showed that characteristic infantile reaction without apparent cause, and 6 did not respond because the feet were very cold.

In studying the results of the observations a number of very interesting facts is apparent. It will be seen that the results bear a certain definite relation, first, to whether or not the babies could stand or walk, and, secondly, to their age. Ninety per cent. of the

babies under five months of age showed the characteristic infantile reflex. Of the children between five and nine months of age, 84 per cent. of those who were unable to stand showed the typical infantile response. From nine months up to one year, 86 per cent. of those unable to stand showed the typical infantile reflex. Of the babies examined between one and two years, only 18 were unable to stand, and of these 18 only 44 per cent. gave the typical infantile reflex, giving one the impression that after the age of one year the infantile response is much less apt to be present, although the amount of material makes the observation less valuable.

If the results obtained in the examination of all those children who were able to stand but not walk are examined, it will be seen that 75 per cent. present what one may call the mixed infantile and adult reflex, *i.e.*, extension and abduction on external stimulation, flexion and adduction on internal stimulation; 20 per cent. of them gave the infantile response and the remaining 5 per cent. showed a variable result.

Of the infants and children who could walk, a total of 109, 5 per cent., showed the infantile response, 40 per cent. the mixed reflex, and 55 per cent. the adult reflex.

It is universally recognized that the Babinski phenomenon is due to a disturbance in function of the pyramidal tract, and it is likewise generally stated that the infantile reflex is due to a lack of development of the pyramidal tract. One finds in the literature constantly the statement made that when the pyramidal tracts are developed and children walk, that the adult reflex replaces the infantile, but a careful review of the literature fails to find any mention of the fact, although it has probably been observed by neurologists and pediatricists that during the period of childhood in which babies are passing from the condition in which they are normally reclining to that in which they are walking, *i.e.*, the period in which babies can stand, that a so-called mixed infantile-adult reflex is present, in which extension and abduction occur if the outer edge of the plantar surface is stimulated, flexion and adduction on internal stimulation.

CONCLUSIONS.

(1) The most valuable result can be obtained on single stimulation. Repeated stimuli disturb the child and render the result unsatisfactory.

(2) Babies should always have warm feet if a satisfactory result is to be obtained.

(3) In eliciting the Babinski phenomenon the outer side of the plantar surface should be stimulated, the lightest stimulation necessary for a result being employed.

(4) Eighty-five per cent. of children under one year of age who could not stand showed the infantile reflex, and only 50 per cent. of children over this age who could not stand showed the same phenomenon.

(5) Of the infants and children who could stand but could not walk, 75 per cent. showed the mixed infantile and adult phenomenon, 20 per cent. the infantile phenomenon, and in 5 per cent. the result was variable. Of the children who could walk, 55 per cent. showed the adult reflex, 40 per cent. the mixed reflex, and 5 per cent. the infantile reflex.

(6) The so-called Babinski phenomenon is practically of no value in infancy and childhood when the children cannot walk, and is then only of value if one is cognizant of the reflex present before the diseased process began.

ETIOLOGY OF ACUTE EPIDEMIC POLIOMYELITIS.—Krause and Meinicke (*Deutsch. Med. Woch.*, April 7, 1910, No. 14), in a second communication on the etiology of acute anterior poliomyelitis, review the recent advances made by the different workers on the subject, and then give the results of their own work. Most of the other workers have had negative results with regard to infecting rabbits, although nearly all have had successful results with monkeys. These authors think that the failure in rabbits has been due, in part, to the custom of injecting the virus intradurally. They prefer the intraperitoneal route, because so much more virus can be injected, and have had favorable results. They found that the virus of the disease was contained not only in the central nervous system of human cases, but also in the cerebrospinal fluid and parenchymatous organs. They obtained it in the blood and cerebrospinal fluid during life. They recommended the use of rabbits for further investigation of the excreta of patients in order to find if the disease is transmitted in this way.—*Boston Medical and Surgical Journal*,

THE THERAPEUTIC USE OF SEA WATER IN INFANTS.*

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The therapeutic use of sea water by subcutaneous injections in infants was first advocated by Simon in 1905. It was a corollary to the work on marine life put out by Quinton in 1904. Quinton pointed out the chemical resemblance of cell plasma and sea water, and showed how he was able to preserve the life of white corpuscles of the blood longer in an isotonic sea water solution than in a normal saline solution; but this was not so if the solution was boiled.

This led to the use of isotonic sea water solution to restore to the cell in disease its activity and to renew the chemical properties of the plasma surrounding it.

Simon, in his work, "*Applications Therapeutiques de l'Eau de Mer*," published in 1908, advocates its use among infants in bronchopneumonia, gastroenteritis and congenital debility, presumably because these three affections constitute the cause of death among infants in over 70 per cent. of the deaths under one year.

Through the use of sea water injections in these cases Simon reports very brilliant and unusual therapeutic results. So extraordinary were these results that after his lectures in this country the treatment was given to a number of infants at St. Mary's Infant Asylum through the interest taken in the subject by Dr. Timothy Leary. The Pathological Department of Tufts Medical School furnished a supply of the sea water prepared after Simon's routine sufficient to test its action in over 50 cases.

The sea water was obtained in sterile containers in a locality far enough away from land and at a sufficient depth to insure its purity. This was made isotonic with normal blood serum by adding 190 parts of sterile water to 83 parts of sea water and filtering the solution through a Chamberland filter. This was sealed in containers holding 150 c.c. and modelled after those

* Read at the meeting of the New England Pediatric Society, May 21, 1910.

described by Simon. The injections were made by gravity through platinum-lined needles into the gluteal or scapular region of the back. From 30 to 50 c.cm. were given at a dose, and beyond the fear occasioned by repeated injections gave no more trouble than injections of the diphtheria antitoxin.

All of the cases selected for treatment were dangerously ill and the sea water was used as an adjunct to the regular treatment.

In the very grave cases it was injected daily, and in the less grave cases every three or four days.

The number of injections varied from a few given daily to thirty or forty given over a course of treatment that covered three or four months.

The first 12 cases were of bronchopneumonia. Simon states that in bronchopneumonia the sea water relieves dyspnea, re-establishes a failing circulation, arouses infants from stupor and tends to clear the lungs gradually. He does not claim that it aborts the disease or that it causes any sudden changes in the temperature. In all cases he recommends that it be used in conjunction with the recognized treatment of the disease.

CASE I. was a puny, rachitic, anemic infant, eleven months old, who had been ill fourteen days with bronchopneumonia when the first injection was given. The lungs showed areas of consolidation sufficiently large to be demonstrated in both lungs. The temperature was running from 103° to 104° F., and the pulse was thready, irregular and at times uncountable. The infant was intensely pale, but was conscious and took notice. The cough was almost incessant. Thirty c.cm. of sea water were injected into the buttocks daily for eighteen days.

The temperature became irregular after the first injection; at first fell to almost normal, but soon returned to a night temperature of 103° F., declining by lysis so that it was normal on the twenty-fifth day of the disease. There was marked general improvement in the condition of the infant after the first injection. The baby was comfortable, breathed more easily and was not "fretty." The physical signs remained about the same. After five days' treatment the infant showed more distress for a day or two, took but little nourishment and vomited at intervals. After that, although the temperature was high, there was an improvement in the general condition and in the physical signs in the lungs, and the baby made a good recovery.

CASE II. was a well-developed and nourished infant, eleven months old, who had been sick for ten days. Both lungs showed patches of consolidated lung tissue. The temperature was irregular, varying from 100° to 104° F.; the pulse was rapid and the dyspnea was marked. It was given a daily injection of 30 c.cm. of sea water for eighteen days. Relief of dyspnea and general improvement were noticed at first, but on the nineteenth day the prostration became marked and the infant gradually lost ground. There was a complication of double otitis media and extension of the consolidation of the lung. The infant became somnolent, looked thin and pinched, and the condition was alarming. On the twenty-fourth day of the disease there was marked edema of the feet, which disappeared on increasing the injection to 60 c.cm. Small subcutaneous hemorrhages formed in the skin of the abdomen and the infant died on the twenty-sixth day of the disease.

CASE III. was a puny, anemic infant, age unknown, who entered on December 17, 1908, with a temperature of 101°F. Examination showed numerous fine râles over both chests, but no areas of consolidation could be detected until the 23d. Then an area was found in the left back in the posterior axillary line. December 25th 30 c.cm. of sea water were injected, and daily for the next six days. December 27th an area of consolidation, the size of an infant's palm, was found in the right lower lobe at the base.

After the first two injections the infant seemed more comfortable, breathed more easily and was remarkably bright. The temperature fell by lysis and became normal on December 31st. Infant made a good recovery.

CASE IV., a fairly well developed infant of nine months, had had bronchopneumonia six months previously. December 15th was taken with cough, prostration, rapid respiration and temperature of 103°F. Examination showed on December 21st dullness in right posterior axillary line with bronchial breathing over a small area. Two days later area of consolidation found in left lower lobe. Infant was very sick, was dull, had marked pallor, laborious respiration and general prostration. Given 30 c.cm. sea water in buttocks daily for six days. The improvement was immediate and the baby made a good recovery.

CASE V. was an infant five months old, entered in poor con-

dition on October 20, 1908. History unknown. Gained 3 pounds in weight in ten weeks and was doing well when it developed double otitis media and shortly afterward examination showed bronchopneumonia in both lungs. On the fifth day of disease it was given 30 c.cm. of sea water subcutaneously and thereafter every other day. There was general improvement at first and the temperature came down, but there was an exacerbation on the fourteenth day of disease and the infant became alarmingly sick. There was no improvement and the baby died on the nineteenth day of the disease.

CASE VI. was an infant nine months old, healthy, which developed whooping-cough. February 1, 1909, in the fourth week of the disease, examination revealed a bronchopneumonia. On the fifth day of the pneumonia he was given 50 c.cm. of sea water and this was repeated daily. After the first injection there was marked improvement. Infant took food better and seemed more comfortable. On the fifteenth day of the disease physical examination showed an area of consolidation low down in the right lower lobe and in the midscapular region of the opposite side. Temperature was irregular. On the twenty-sixth day of the disease conditions were improved and the temperature was practically normal. The lungs did not clear, however, and on the thirty-sixth day of disease examination showed an extension of the process in the left back. The infant had paroxysms of coughing. It failed in strength gradually until the condition was grave, and died on the forty-fifth day of disease.

CASE VII., infant sixteen days old; fairly well developed and nourished. It had thrush. April 1st it developed bronchopneumonia. Both lungs showed areas of bronchial respiration with crepitant râles. The infant was very much prostrated, and on the second day of disease was given 30 c.cm. of sea water, and again on the fifth, sixth and seventh days of the disease. There was no improvement noticed and the infant died on the seventh day of the disease.

CASE VIII. was a fairly healthy boy, age unknown. Developed bronchitis, which persisted in spite of ordinary treatment. It was given 45 c.cm of sea water and afterward 30 c.cm twice a week for two months. The cough ceased and the lungs gradually cleared and the infant gained $1\frac{1}{2}$ pounds in weight. March 25th it began to cough and run temperature of 101°F . Ex-

amination showed an area in right axilla where breath sounds were bronchial. The infant was very sick, pulse rapid and weak, and general condition not improved by the sea water injections, which were continued as before. On the seventeenth day of the disease another area was found in the lower left lobe. The supply of sea water ran out on the sixteenth day of the disease, but the infant had been gradually failing and died on the twenty-fifth day of the disease.

CASE IX., infant nine months old, anemic and in poor condition. Had whooping-cough. February 25, 1909, developed bronchopneumonia. He was at once given 30 c.cm. of sea-water, at first every other day and then, as his condition became graver, daily. There was at first improvement, but it was only temporary and the temperature remained 104°F.; the condition in the lungs did not improve, the infant whooped a great deal, lost ground gradually and died on the seventeenth day of the disease.

CASE X., poorly developed and nourished infant, six months old. March 21, 1909, developed bronchopneumonia. He was given 50 c.cm. of sea water, which was repeated twice in four days, but with no improvement noticed, and the infant died on the fifth day of the disease.

CASE XI., an infant thirteen months old, entered in poor condition with whooping-cough March 1, 1909. Twelve days later it was found to have bronchopneumonia. There were crepitant râles found in both lungs in the backs and in the right in the lower lobe an area of consolidation the size of a child's palm. Thirty c.cm. of sea water were given on sixth day of the disease and then daily, but the infant failed rapidly and died on the eighth day of the disease.

CASE XII., infant in poor condition, eighteen months old. Entered February 16th, 1909, with high temperature, and examination showed area of small size in right lower back, median line, over which was heard bronchovesicular breathing and high-pitched râles. Fifty c.cm. of sea water were given daily, but there was no improvement of symptoms noticed, and on the ninth day of the disease there was found an area of consolidation on the opposite side. The infant did poorly and died on the fifteenth day of the disease. In all these cases of pneumonia the treatment consisted of stimulation with strychnia and brandy and the treatment carried out in wards, the windows of which were open day and

night, so that the room temperature was but little above the outside winter temperature.

I have gone into details with the above cases, as in them was noted most notably the temporary improvements following sea water injections.

The remaining cases I have tabulated for brevity and ease of observation.

In congenital debility Simon refers chiefly to the gain in weight, the raising of temperature to normal and the increase in appetite after using the sea water.

The following table of 16 cases of congenital debility were given 30 c.cm. of sea water every three or four days and showed the following results after treatment:—

CASE	AGE	WEIGHT	LOSS OR GAIN IN WEIGHT	TEMPERA- TURE.	APPETITE	DEJEC- TIONS.	RESULT.
No. 1	5 weeks	5 lbs.	.....	Subnormal	.....	.....	.....
No. 2	2 days	5¼ lbs.	Loss	Subnormal	Loss	Green	No imp.
No. 3	2 weeks	6 lbs.	Loss	Subnormal	Loss	Green	No imp.
No. 4	3 weeks	4¾ lbs.	Loss	Subnormal	Loss	Green	Imp
No. 5	3 weeks	6¼ lbs.	Loss	Subnormal	Loss	Green	No imp.
No. 6	5 weeks	5¼ lbs.	Loss	Normal	Loss	Green	No imp.
No. 7	3 weeks	5½ lbs.	Stationary	Normal	Good	Green	No imp.
No. 8	4 days	4½ lbs.	Loss	Normal	Good	Green	No imp.
No. 9	5 weeks	5½ lbs.	Loss	Subnormal	Loss	Green	No imp.
No. 10	Unknown	4¾ lbs.	Loss	.....	Loss	Normal	No imp.
No. 11	4 weeks	5¼ lbs.	Stationary	Normal	No imp.	Green	.....
No. 12	4 days	6¼ lbs.	Loss	Normal	Imp.	.....	Imp.
No. 13	2 weeks	4¾ lbs.	Gain	Normal	Imp.	Normal	.....
No. 14	2 weeks	5¾ lbs.	Gain	Normal	Imp.	Normal	.....
No. 15	4 days	4½ lbs.	Gain	Normal	Imp.	Normal	.....
No. 16	5 weeks	5 lbs.	Loss	Normal	No imp.	Normal	.....

Finally, in the class discussed as gastroenteritis by Simon, most, if not all, of which were cases of acute indigestion and fermental diarrhea, stress is laid on the cessation of vomiting, the improvement in the movements and the gain in weight.

The following 19 cases were given 30 c.cm of sea water every three or four days and showed the following results after the injections:—

CASE	AGE	WEIGHT	DEJECTIONS	VOMITING	TYPE.
No. 1	3 months	Loss	Green—no imp.	None	Chronic intestinal indigestion
No. 2	3 months	Loss	Green—no imp.	Ceased	Acute indigestion
No. 3	8 days	Loss	Green—no imp.	Ceased	Acute indigestion
No. 4	3 months	Gain	Green—no imp.	Occasional	Chronic indigestion
No. 5	2 months	Gain	Yellow, became green	Ceased	Acute indigestion
No. 6	4 months	Loss	Green—imp.	Occasional	Chronic indigestion
No. 7	5 months	Gain	Green—imp.	Occasional	Chronic indigestion
No. 8	5 months	Gain	Green—imp.	Ceased	Fermental diarrhea
No. 9	2 days	Loss	Green—no imp.	None	Chronic intestinal indigestion
No. 10	2 weeks	Loss	Green—no imp.	Ceased	Acute indigestion
No. 11	3 weeks	Loss	Green—imp.	None	Chronic intestinal indigestion
No. 12	3 weeks	Loss	Green—no imp.	None	Chronic intestinal indigestion
No. 13	5 weeks	Loss	Green—imp.	None	Chronic intestinal indigestion
No. 14	3 weeks	Stationary	Green—imp.	None	Chronic intestinal indigestion
No. 15	4 days	Loss	Green—no imp.	No imp.	Acute indigestion
No. 16	5 weeks	Loss	Green—no imp.	....	Chronic intestinal indigestion
No. 17	4 weeks	Stationary	Green—imp.	Ceased	Acute indigestion
No. 18	4 days	Loss	Green—no imp.	Ceased	Acute indigestion
No. 19	3 weeks	Loss	Green—imp.	No imp.	Acute infectious diarrhea

In looking over the results obtained it cannot be claimed that the subcutaneous use of sea water has in general any remarkable effects. The subcutaneous use of saline fluid has long been recognized as of great benefit, especially where there is any disturbance of the circulatory system, as in shock or in the disturbances of the vasomotor centers in infectious fevers. Here the normal salt solution acts as a stimulant, and it is precisely this action which the injections of sea water sometimes produced. These results can be produced, however, as we have convinced ourselves in some control experiments, with normal salt solution just as well.

Results obtained by other observers have differed a little. Le Boutillier, in this country, reports 21 cases in the *ARCHIVES OF PEDIATRICS*, most of them malnutrition of older children and inanition in the very young. Some of his results were good and some of them insignificant. Goepf has used the solution mostly in adults, and thinks that there may be an attendant psychotherapeutic action. White, in the *Boston Medical and Surgical Journal*, reports rather unfavorably on its uses in skin diseases. L. G. Simon, Pater, Vedy and Manjour are among European reporters who failed to get the results as set forth by Simon.

THE TREATMENT OF ENURESIS BY RE-EDUCATION.

BY CHARLES HERRMAN, M.D.,
New York.

In a paper on enuresis in the *New York Medical Journal* of February 5, 1910, Dr. Wachenheim shows why enuresis should be classed as a tic, and on the basis of this theory treats the condition by having the patient urinate at certain stated hours each day.

Three years ago, in a study of a series of cases of tic (see *ARCHIVES OF PEDIATRICS*, June, 1906), I was struck by the frequency with which enuresis occurred in these patients or in other members of the same family. Oppenheim has also called attention to this fact. It occurred to me at the time that the underlying cause might be similar, and on that assumption I have employed a simple method of treatment which I shall briefly describe later.

There can be little doubt that the vast majority of the cases of enuresis represent a pure functional neurosis, for we rarely find any marked changes in the urine or in the genito-urinary tract. We are dealing primarily with a psychical disturbance, which may very well be compared to stuttering. In the latter the vocal and respiratory organs are normal, but the patient does not know how to use them properly; he is like an unskilled musician who has a first-class instrument but does not know how to play upon it. The patient with involuntary micturition has perfect organs, but lacks the proper control of the mechanism, and like all patients with tics, he lacks especially the power of inhibition. It therefore seemed to me that a method which had been successful in the treatment of tics might be equally successful in the treatment of enuresis. As is well known, the re-educational treatment of tics consists in having the patient perform voluntarily a number of times the muscular action which he performs involuntarily and unnecessarily; that is, the so-called method of conscious repetition of Brissaud. For example, if the patient has a twitching of the eyelids the exercises consist of voluntarily opening and closing the eyes a certain number of times, usually before a mirror. Scripture puts it as follows: "The tic is carried out by mental activity of less than full consciousness; the entire act may have become completely subconscious. Perfect voluntary

imitation of the act trains the mind to doing exactly the same act consciously. Thereafter the act is no longer an involuntary subconscious one, but a voluntary conscious act. The tic has been killed."

Applying this method to the treatment of involuntary micturition, I have had the patient urinate at regular stated times, but every time he urinates he is directed to void a little, say 2 drams, and then stop; then void 2 drams more and stop, and so on until the bladder is emptied. In this way he exercises the mechanism which controls urination; he trains and educates himself in the voluntarily execution of the act. After this has been done two or three times under the direction of the physician the patient can carry it out himself.

250 West 88th Street.

ARTHRITIS DUE TO INJECTIONS OF ANTIDIPHtheritic SERUM IN A CHILD.—Augstron (*Jour. de Med. de Bord.*, December 5, 1909) remarks that slight local reactions have been frequently noted in man, but the present case is noteworthy from the intensity and persistence of the local phenomena. A boy, aged six years, was being treated for hemophilia. On the 18th of June, after a severe epistaxis, 20 c.c. of Roux serum was injected under the skin of the abdomen; no reaction followed. On June 27th, after a fresh hemorrhage, 10 c.c. of the serum was injected under the skin at the outer part of the left hip. Half an hour later the child complained of pain in the left leg, and there was much tenderness at the site of injection. Three hours later movements of the leg were painful; the puncture showed a small ecchymosis surrounded by a pallid area the size of a five-franc piece. The thigh was edematous, and here and there were violent patches and areas of urticaria. The edema extended next day upward to the lumbar region and down below the knee. After this the phenomena slowly disappeared. The writer considers they were not due to sepsis, as they began half an hour after the injection, and there was no rise of temperature, but that they depended in some way on the serum reaction itself.—*British Journal of Children's Diseases.*

THE FINKELSTEIN-MEYER METHOD OF INFANT FEEDING BY "CASEIN MILK."

BY JEROME S. LEOPOLD, M.D.,

Assistant in the Department of Pediatrics in the Post-Graduate Hospital and Medical School, New York City.

In his contributions to the subject of alimentary intoxication Finkelstein* calls attention to the fact that nutritional disturbances in infants are usually due to the sugars and salts in the milk. Fats in the presence of sugars and salts may also cause intestinal disturbances. Casein, according to Finkelstein, has no more ill effect on infants than plain water. Indeed, casein tends to neutralize the fermentation processes caused by the sugars, and for this reason has a certain curative action in intestinal disturbances. These statements of Finkelstein are based on both experimental and clinical observations made by Finkelstein and his school. They have shown* † that salts and sugars may give rise to dyspeptic stools, fever, loss in weight and even the severest grades of intoxication in infants, and that these symptoms can be cured by the exclusion of the sugars and salts from the food.

Some months ago Finkelstein and Meyer‡ published a preliminary report of their new food for those infants suffering from disturbances in nutrition. The principle of this food consists in the fact that it contains very little salts and sugars and a large amount of fat and casein.

Following this publication there appeared a paper by Reuss and Sperk§ from Escherich's clinic in Vienna, in which the authors reported a series of cases fed on this "casein milk" with very good result.

Finkelstein and Meyer have now published their completed work¶ in which they present their experimental studies and give their results in a series of 150 cases that had been fed on this "casein milk." Their results are brilliant.

During the past six months we have been using this "casein milk" in the babies ward of the Post-Graduate Hospital on Dr.

* Finkelstein, *Jahr. f. Kind.*, Bd. 68.

† Meyer and Leopold, *ARCHIVES OF PEDIATRICS*, October, 1909.

‡ Finkelstein and Meyer, *Monat. f. Kind.*, April, 1909.

§ Reuss and Sperk, *Wein. Klin. Woch.*, 1910, No. 1.

¶ Finkelstein and Meyer, *Jahr. f. Kind.*, May and June, 1910.

Chapin's service. Dr. Chapin has reported a few of our cases.* A conclusion as to the value of this method of feeding cannot be drawn from our small series of cases. When we have a larger number we hope to report our results. While at the Kinderasyll in Berlin I was given the opportunity of treating a number of infants by this method of feeding, and also saw many cases treated by Meyer and Finkelstein themselves. The results, as reported by the authors, are exceedingly good.

The object of this paper is to outline the preparation of this "casein milk," the indications for its use, and the method of its administration, so that this milk may be given a trial in other American hospitals.

Preparation.—Heat 1 quart of full milk to 100°F. Add four teaspoonfuls of the essence of pepsin and stir. Let this mixture stand at 100°F. until the curd has formed (this usually takes about half an hour). Filter off the whey from the curd by means of a linen cloth and hang up the cloth containing the curd for one-half hour in order to be rid of the whey. Then the curd is removed from the linen cloth and is pressed through a rather fine sieve two or three times by means of a wooden mallet or spoon. One pint of water is added to the curd during this process. The mixture should now look like milk and the precipitate must be *very finely* divided. To this mixture 1 pint of buttermilk is added. Finkelstein and Meyer use buttermilk in the preparation of this food for the following reasons: (1) On account of the small amount of milk sugar it contains; (2) to obtain the good effects of the lactic acid, and (3) because buttermilk can be kept for a long time.

The composition of this "casein milk" is as follows:—

Proteid	3	per cent.
Fats	2.5	" "
Sugar	1.5	" "
Salts	0.5	" "

One quart of this milk contains about 370 calories.

Indications.—This food is indicated in infants with intestinal disturbances—that is in cases of enteritis (dyspepsia), atrophy (decomposition), and cholera infantum (intoxication).

Administration.—"Casein milk" should at first be given in

* Chapin, Meeting of the American Pediatric Society, May, 1910.

very small amounts in cases of enteritis, and in larger amounts in cases of atrophy, every two or three or four hours. There is usually a loss of weight during the first few days that this food is given. The stools become homogeneous, however, and the temperature, if it has been elevated, drops to normal. After the stools have become homogeneous a small amount of sugar is added to each feeding—at the beginning not more than $\frac{1}{2}$ to 1 ounce for the entire day's feeding. In most cases a gain in weight results after the sugar has been added. Then very gradually the amount of each feeding is increased and more sugar is added. There is considerable difference in the influence on the organism of the different sugars. I have shown at Finkelstein's clinic (results not yet published) that a combination of dextrin and maltose causes the least disturbance in infant feeding, and that lactose should not be used in milk dilutions. Saccharose is much less injurious than lactose.

This "casein" feeding is kept up for weeks or months—until the gastrointestinal disturbance has entirely disappeared and the infant has made a good gain in weight. Then the regular milk mixture is resumed. No cathartics are to be used before or while this feeding is given.

701 Madison Avenue.

MELENA NEONATORUM.—H. O. Mosenthal, New York (*Journal American Medical Association*, May 14), reports the third case in which transfusion has been employed as a relief for the condition of melena neonatorum, the operation being performed by end-to-end anastomosis of the baby's femoral vein to the radial artery of the father. The result was an immediate and permanent cessation of hemorrhages and the recovery of the child, who has had no recurrence of the bleeding. The cause of the hemorrhages evidently lay, in this case, in the abnormal clotting quality of the blood which, being replaced by normal blood, at once clotted normally. There may be other cases due to other causes, but that does not affect the value of transfusion, and all cases may be due to this cause. Transfusion, he thinks, therefore, is always indicated.—*Medical Review of Reviews*.

THE EDUCATION OF THE MOTHER IN ITS RELATION TO INFANT MORTALITY.

BY E. BLANCHE STERLING, M.D.,
Wellesley College.

The problem of infant mortality is not a simple one. Eugenics, economics, the birth rate, and municipal, social, medical, hygienic, and educational problems are all met in a study of its many phases. Evans* states that "the philosophy of the situation would mean that before the problem is settled we must come back to the people before the babies are born; and to the circumstances of society that are responsible for the conditions into which the baby is born." Tyler,† of Amherst, declares that "the best means of decreasing infant mortality is to make sure of a race of healthy babies. Healthy children demand healthy parents."

With these considerations in view, it seemed that an investigation of the experiences of a number of women whose special training in matters of health was definitely known might prove instructive. Accordingly, a set of questions covering the occupation before marriage, the number of children, manner of birth, infant feeding, etc., were sent to 105 married graduates or former students of a successful normal school of physical education. Each of these women had spent one, two or three years at the school, where rational physical exercise, personal hygiene, and right habits of living were emphasized. Ninety-one replies were received and form the basis of this paper.

The investigation covers a period of nearly seventeen years, the first baby of the series being born in September, 1893. Of the 91 marriages, 25 have been sterile to date, but it must be remembered that some of these marriages have taken place within the last few years, and later statistics might furnish different results. This fact must, of course, also be taken into account when considering the number of children born of these marriages.

Of the 66 mothers, 56 were occupied in teaching for periods varying from three months to twelve years. In obtaining an aver-

* Report of the Proceedings of the Third Mid-Year Meeting of the American Academy of Medicine, November 11-12, 1909, in *Journal American Medical Association*, January 1, 1910.

† *Journal American Medical Association*, January 1, 1910.

age it was necessary to eliminate 10 of these, because their answers were too indefinite to show exactly how long they were thus occupied. The average length of time of the 46 who gave definite replies was nearly three and one-half years. It will be seen from this that many of these women were for years engaged in the practice of a profession which entails considerable nervous strain, particularly in women. No attempt has been made to ascertain the ages of the mothers at marriage, but the replies indicate that they probably range from the early twenties to over forty. One woman who aborted at three months states that she was forty-two years old when she married.

In the 66 fertile marriages 112 pregnancies have occurred, the number per marriage ranging from one to four. Prof. Irving Fisher* refers to the declining birth rate among college graduates, and says that "they are not keeping up their end in the population." In view of this fact, the above figures are rather suggestive, though sufficient time has not elapsed to make them either corroborate or refute his statement.

As a result of the 112 pregnancies, there are living to-day at the end of almost seventeen years, 100 children. This gives a total death rate from all causes of 10.7 per cent. Proceeding to an analysis of the causes of the deaths of these children, it will be found that fully one-half of them belong to what Holt† calls "hopeless cases," and what Gunn* speaks of as the "so-called unavoidable causes." That is to say, 6 of the pregnancies resulted disastrously through abortion, premature birth, or birth causes at full term. The reports, coming as they do from the mothers, are not as definite as might be desired, but there seems to be no doubt that in each of these 6 cases the child died before, at, or immediately after birth. The first was a case of eclampsia with delivery at the seventh month. The second an abortion of three months. The third a facial presentation, with death following delivery, though the heart was beating at birth. The fourth fatality was due to a prolapsed cord. The fifth was "still-born," owing to "very serious complications"; and the sixth the mother calls a "miscarriage at seven months."

Subtracting these 6 children, we have 106 children surviving birth, giving a mortality rate of 5.6 per cent. Of the last-named 6, 2 died of meningitis—one at nineteen months (an eight months'.

* *Journal American Medical Association*, January 1, 1910.

† "Infant Mortality and Its Reduction," by L. E. Holt, in *Journal American Medical Association*, February 26, 1910.

child) and the other at two years. One death was caused by prematurity, which was the result of uremia, and another of the 6 was caused by strangulation at four months. Of the remaining 2, the cause and time of death are not stated. That one was not premature is evident from the fact that mention was made of the circumstance that the baby was large. The only statement made in the second case—apart from the death of the child—is that the birth was not a normal one.

As to the question of prematurity—a potent cause of infant mortality—Ballantyne* states that 20 per cent. of the births in maternity hospitals are premature. In my series there were 5 (possibly 6) cases, a percentage of 5.6. This is, I think, a low rate for private practice, which is, of course, lower than the figures given for maternity hospitals.

J. Whitridge Williams† makes the statement that 1 in every 5 or 6 pregnancies ends in abortion. In studying my series and counting those stated as occurring “at the seventh month,” or “at seven months” (because there is no means of knowing whether these occurred before or after the twenty-eighth week), the case reported as “premature due to uremia,” and one whose cause and time of death is not reported, I find 5 cases. This gives a percentage of 4.4 instead of 16 $\frac{2}{3}$ or 20 as in Williams’s experience.

Taking up the question of infant feeding, we come to a problem of much importance. It is universally acknowledged that no infant food is comparable to mother’s milk, and everywhere the baby’s champion is laboring to spread the propaganda of maternal nursing. Holt‡ has shown this to be true particularly among the poor, and has noted the fact that the well-to-do and educated classes have more success with artificial feeding than do the poor and ignorant. This, of course, is due largely because of the care and intelligence required in the preparation of artificial food. Success with artificial feeding is more pronounced if the baby gets its start with breast milk. Ballantyne and Newman speak of the first four weeks of life as the neo-natal period—when the infant is becoming adapted to extrauterine life.

In the series of 106 children surviving the ordeal of birth, practically 70 per cent. were breast fed for periods varying from one to twelve months, though in many instances artificial feed-

* Quoted by Newman in “Infant Mortality,” 1907.

† “Text-book of Obstetrics,” second edition, 1909.

‡ “Infant Mortality and Its Reduction,” by L. E. Holt, in *Journal American Medical Association*, February 26, 1910.

ing was used as an aid to the breast; 77 per cent of the mothers were able to nurse one or more children for one or more months. Of the 6 children who died, 2 were nursed one or more months, and 4 were not nursed. Of the nurslings who succumbed, one died of meningitis at two years of age, and the other of strangulation at four months.

Of the 112 pregnancies, 75 resulted in normal or spontaneous births, 34 were not normal, and in 3 cases no report was made on this point.

Summary.—In a series of 112 pregnancies occurring in 66 women who had much training in physical exercise, and in whose student life the study of hygiene had been specially emphasized, the following facts are noted. It must be remembered, however, that a series of 112 cases is not a large one, and while the results of this study are very suggestive, we could not call them conclusive unless corroborated by further investigations:—

(1) The death rate among the children of these marriages is lower than that given for the registration area of the United States, which is about 14.5 per cent.

(2) Eliminating the “so-called unavoidable causes” connected with birth, the death rate is markedly lower.

(3) The percentage of premature births is scarcely more than one-quarter that noted by Ballantyne in maternity hospitals.

(4) Abortions occur about one-quarter as frequently as in most series of cases.

(5) The percentage of breast-fed children is not as great as that given by Holt for New York City, which is probably about the average for all large centres of population in this country.

We must not forget that in the school which these young women attended subjects pertaining to health were of paramount importance. I do not think that hygiene will ever become vital to the young women of the land until the academic councils of the various schools make as ample provision for such a course as they do for mathematics, or languages, or literature. Students will not take seriously a subject which the governing boards neglect.

“If we would solve the great problem of infant mortality, it would appear that we must first obtain a higher standard of physical motherhood.”*

* “Infant Mortality,” George Newman, 1907.

THE HYGIENIC AND DIETETIC TREATMENT OF DELICATE CHILDREN BY THE CLASS METHOD.*

BY WM. R. P. EMERSON, M.D.,

Boston.

The problem of the treatment of delicate children is not a simple one. Its solution depends upon finding the causes of the condition. Heredity cannot always be blamed, because most delicate children were normal and healthy infants.

If the child does not improve under our care it is safe to say that we have not carried our investigations far enough.

The belief that adequate causes can always be found by looking thoroughly into every detail of the child's life should mark the beginning of success in its treatment.

Acting upon this supposition, the writer, in the fall of 1908, collected into a class 15 of the weakest and most poorly-nourished children from the 4,000 or 5,000 patients coming to the Children's Department of the Boston Dispensary. Study and treatment were conducted as follows:—

First:—

The past record of each child was considered carefully.

A new and complete physical examination was made.

The child's diet and home conditions were investigated by giving each child a small record book to be brought in at the next visit.

The child or parent was directed to keep a complete record of everything the child ate or drank for the following forty-eight hours.

The time spent indoors, in sleep, out of doors, the exact number of minutes at meals, and such details as seemed necessary in each particular case were considered.

Second:—

A social visitor was sent to the house, where she filled out a special card, giving all the essential details in the child's home surroundings.

Third:—

Another card was filled out in relation to the child's diet habits at meals, its likes and dislikes as regards the chief articles of food.

* Read before the Eleventh Meeting of the New England Pediatric Society, Boston, May 21, 1910.

Based upon the data thus obtained, a talk was given to the class as a whole, explaining hygiene and diet and the open-air treatment. A few values were given.

Positive directions were given rather than negative ones.

The child was encouraged to substitute cocoa for tea and coffee, fruit for sweets, and simple puddings for rich pies and cake.

Hesitation was felt in taking children who had any functional or organic affections. It was found that such children gained as rapidly as the others.

The class was held on Saturday mornings for one hour.

As the child came in he was weighed and placed in order in the class according to his gain or loss in weight.

The weekly report books were examined.

The visitor in charge of the patient made her report.

Individual suggestions and directions were given.

Where the child gained in weight, little was said.

If the child did not gain, a careful study was made to ascertain the reason, and almost without exception the reason was easily found.

The other children and parents were sympathetic listeners, eager to know the cause of the child not gaining.

The bringing out of practical points in this way constituted the most effective method of instruction.

The analysis of the class records showed, as factors in their poor condition, adenoid growths in the nasopharynx, close relation to tuberculosis, frequent carious teeth, fickle likes and dislikes for food, rapid eating, the use of liquids to wash down the food, hygienic ignorance and lack of control on the part of the parents.

It was found that if a child was absent for more than one week from the class he almost invariably lost weight.

On June 1st there were 6 graduates from the class; that is, 6 children had gained normal weight and health.

During the summer 2 more were added, making 8 who had gained normal weight and health.

The other 7 were in excellent health and lacked but a few pounds or ounces of being normal in weight.

Places were provided for all these children for summer outings and vacations; they were weighed again in the fall; their average monthly gain was less during the summer months than during the winter months when they were members of the class.

The following were found to be the most important points in the treatment of these children by the class method:—

Parents.—In the class method the parents observe and learn; their intelligent coöperation is secured; where the parents cannot come to the class it is necessary that a social worker act *in loco parentis*, else the child does not gain.

Window Tents.—Window tents were used by about one-half of the class.

It serves a double purpose; it gives fresh air to the child at night and also during the rest period in the daytime without cooling off the rest of the house.

The mothers often use them and are benefited. Tents help utilize rooms not otherwise suitable for sleeping purposes. In stormy weather, or when the mother is too poorly to go out, the child can get its airing by the use of the window tent.

The whole cost of the tent need not exceed \$2.

Those using tents gained on an average of $3\frac{3}{10}$ pounds more than those who did not.

Diet and the Proper Mastication of Food.—The dietary was based upon the forty-eight hour list of food.

Cereals were added and the diet balanced.

The child was encouraged to take from three to six glasses of milk daily.

The total food value was increased from an average of 1,200 calories per day to an average of 2,000 calories per day.

Every possible means was used to get the child to eat slowly, in 2 cases it being necessary for the parent to feed the child for short periods.

Schools.—Children attended school regularly. In a few cases it was necessary to take them out for a short period. They always gained immediately upon being taken out of school.

The writer believes that there should be open-air schools for all delicate children. The establishment of such schools would mark a great step in advance in preventive medicine.

CONCLUSION.

The class method is particularly well adapted to the proper treatment of delicate children. The spirit of competition, the "game" in it has a powerful attraction for the child, aiding greatly in his control and management.

The steady gain in weight in children following directions furnishes a strong incentive to the parents and the children alike.

The class method makes the necessary instruction of the parents easy and effective.

The results obtained each week remove prejudices and fears and convince in a moment, as if by magic, where hours spent in arguments fail.

In the giving of instructions and directions to the parents and the children assembled together there is an enormous saving of time.

The class method furnishes the best training school for the social worker. She can here learn what instructions are to be carried out, what the object sought.

She catches the spirit of the work and is enabled to relieve the physician of a large mass of detail which he has neither the time nor the energy to perform and which the social worker is the one person especially qualified by sex and training to carry out.

FRACTURE OF LONG BONES IN CHILDREN.—W. P. Coues (*Journal of American Medical Association*, April 10, 1910) calls attention to the importance of a class of fractures of long bones in children which may pass unrecognized without the use of the X-ray. The subperiosteal fractures may be lacking in crepitus, abnormal mobility and swelling and ecchymosis may be absent. Careful examination, however, may give valuable information. There is localized tenderness along the site of fracture which is increased by the classic test of lateral traction above and below the site. In long fissures or linear fractures, rotation will always give the most pain. Several cases are reported. Treatment of these cases should be the simplest that is adequate to maintain fixation until solid union is obtained and a permanent anatomical and functional result may be expected. Rough manipulation and forcible testing for crepitus should be avoided in diagnosis, and an anesthetic is not required. These children often complain of pain and trouble at points distant from the fracture, and the X-ray examination should not be confined to the part complained of, but should include the neighboring long bones as well.—*Medical Record.*

LACTIC ACID BACILLI: WHAT THEY ARE AND WHAT THEY ARE SUPPOSED TO DO.*

BY ARTHUR I. KENDALL.

(From the Department of Preventive Medicine and Hygiene, Harvard Medical School.)

From the earliest historic times the drinking of sour milk has been practiced by many nomadic and semi-nomadic tribes. Originally these people undoubtedly consumed milk in the fresh state, unacted upon by bacteria, but the advantages of soured milk must early have been appreciated.

Milk that has soured in a proper manner can be kept for some time without further change and yet retain its palatability, a point of great importance in those countries where no other means of preservation are available. Furthermore, any surplus milk can thus be rendered fit for future consumption, and undoubtedly this purely economic factor has been potent in popularizing this natural method of preservation.

In certain instances peculiar methods have been gradually evolved to bring about this souring, and the well-known Kephir granules may be mentioned as a familiar example. Kephir granules consist essentially of lactic acid-producing bacteria and yeasts enclosed in a coagulum of casein. The lactic acid bacilli ferment the lactose of milk, forming lactic acid, while the yeasts cause a secondary alcoholic fermentation which gives increased palatability to the finished product.

Kephir granules and similar ferments, then, are to be regarded as starters, and our present-day use of starters for ripening cream and of dispensing lactic acid bacilli in tabloids is, in reality, the direct descendant, refined to be sure, of the procedure established centuries ago.

Little interest was manifested clinically in these soured milks until Metchnikoff and his school published their observations on the relations of bacterial putrefaction in the intestinal tract to premature senility, and the employment of lactic acid bacilli to counteract this pernicious activity. About this time Grigoroff, a student in Massol's laboratory, called attention to the many instances of longevity among the Bulgarian peasants and to the fact

* Read before the Eleventh Meeting of the New England Pediatric Society, Boston, May 21, 1910.

that sour milk forms an integral part of their diet. Other observations of a similar nature have been collected, and it is upon evidence of this circumstantial nature, rather than upon well-planned and carefully-executed conclusive experiments, that the whole subject of lactic acid therapy rests at the present time.

It is the purpose of this paper to outline, briefly, the salient features of lactic acid therapy: what the lactic acid bacteria are, the kinds of bacteria employed in intestinal therapy, the conditions under which they may be expected to act in a salutary manner and the nature of this beneficial action.

Lactic acid therapy consists essentially in administering by mouth living cultures of lactic acid bacilli, either in milk soured by their action, or as tabloids together with some easily fermentable carbohydrate. The bacteria ferment the carbohydrate in the alimentary tract, producing lactic acid.

The object of this treatment is to restrain the activity of certain proteolytic (putrefactive) bacteria in the intestinal tract.

The proteolytic organisms act upon protein and protein decomposition products, forming aromatic substances, indol, skatol, phenol, creasol and aromatic oxyacids, and these aromatic bodies in turn are absorbed, in part at least, and act as slowly cumulative poisons to their host. Such, at least, is the generally accepted hypothesis.

According to Metchnikoff, who elaborated this method of treatment, the putrefactive bacteria are largely anaerobic in character and are localized in the large intestine.

The lactic acid bacteria, on the other hand, are nonproteolytic in nature and find their most suitable environment in media containing fermentable carbohydrate, which they break down, producing lactic acid in considerable amounts. These organisms do not form putrefactive products and, indeed, under such conditions they metabolize only enough protein to satisfy their nitrogen requirements.

There are many kinds of bacteria which form lactic acid, but in the restricted sense in which the term lactic acid bacilli is used in intestinal therapeutics only those organisms are regarded as true lactic acid bacteria which form lactic acid and smaller amounts of the lower fatty acids, but which do not form putrefactive products from protein, and which do not produce gaseous products from the fermentation of carbohydrate.

In addition to the lactic acid bacteria of sour milk, there are

normal lactic acid bacilli in the intestines of many of the higher animals. The intestinal lactic acid bacteria are very similar, so far as their nutritive requirements are concerned, to those of sour milk, but there is one rather striking difference between the two classes. The sour milk bacteria usually become localized in the small intestine of man and animals, while the intestinal lactic acid bacilli, particularly *B. acidophilus*, which is the best known, find their most suitable habitat in the large intestines. The significance of this difference will be brought out later.

To arrive at a clear understanding of the nature of the antagonism between the lactic acid bacteria and the intestinal putrefactive bacilli will necessitate a discussion of the metabolism of the two types of organism.

We will consider the proteolytic bacteria first. There are several conditions favoring the vegetative reproduction of the putrefactive microbes in the alimentary tract:—

(1) An excess of protein in the diet. Animal protein is far more easily attacked than vegetable protein.

(2) Protein decomposition has commenced.

(3) Imperfect gastric digestion or gastric stasis. In these conditions food is passed into the intestines in a state predisposing to putrefaction.

(4) Intestinal stasis. Any condition retarding the rate of passage through the lumen of the intestines will tend to increase the activity of putrefactive processes.

(5) Impaired intestinal absorption of protein. If the absorption of protein is slow, putrefaction of a bacterial nature will be increased, since the food supply of these bacteria is increased.

Certain other factors tend to limit bacterial putrefactions in the intestinal tract.

(1) Rapid absorption of protein and the products of protein digestion, by reducing the available food supply of intestinal microbes, tends automatically to limit putrefactive processes.

(2) Factors causing the rapid passage of food through the alimentary tract, as cathartics and certain forms of spontaneous diarrheas.

(3) Starvation; by lessening the food supply of bacteria inhibits their activities.

(4) The activity of lactic acid bacteria in a medium containing fermentable carbohydrate.

(5) The presence of carbohydrate alone is not infrequently

associated with a diminution of intestinal putrefaction, as shown by the decrease in the amounts of aromatic substance in the urine.

It would appear, then, that there are two distinct types of bacterial activity in the intestinal tract; the first, essentially putrefactive; the second, fermentative.

The putrefactive organisms are essentially proteolytic, and require protein in their dietary. They do not develop in media containing fermentable carbohydrate in the presence of bacteria capable of forming lactic acid from this sugar.

The fermentative bacteria (lactic acid-producing bacteria), on the contrary, thrive best in media containing sugars. They utilize only small amounts of protein and do not form typical putrefactive products in appreciable amounts. These organisms are distinctly antagonistic in their action upon proteolytic bacteria in saccharine-containing media.

In addition to the proteolytic bacteria, and the fermentative bacilli of the lactic acid type, there is yet a third group of intestinal organisms; a group which is facultative with respect to protein and carbohydrate requirements. That is to say, they can develop well in media containing protein, or in media containing carbohydrate with only small amounts of protein.

This facultative group is by far the largest of the three mentioned, and includes many of the best known and most thoroughly studied of the intestinal flora.

As a familiar example, *B. coli* may be mentioned, and inasmuch as this organism illustrates in a striking manner the fundamental, but by no means generally recognized principle of bacterial adaptation in metabolism it will be well worth while to consider the products of vital activity of this organism in detail. The facts to be brought out are also of the utmost significance in relation to lactic acid therapy.

It appears to be a fact that the facultative group, of which the colon bacillus is a member, can accommodate their metabolism to different classes of food stuffs in a perfectly definite manner. When they are grown in protein media their products of vegetative activity are, chemically speaking, typical of protein putrefaction. If, however, they are grown in media containing carbohydrate, the products formed are almost invariably those characteristic of fermentation. In other words, the facultative bacteria combine, under the conditions stated, the attributes of both the proteolytic (putrefactive) and fermentative organisms.

The details of an actual experiment will elucidate this principle most clearly:—

Two portions of meat juice peptone bouillon were prepared, each of exactly the same composition and reaction. To one portion 1 per cent. of dextrose was added, and the two flasks were then inoculated with the same strain of *B. coli* and incubated a week at body temperature. At the end of that time the contents of the flasks were analyzed chemically.

The flask containing no dextrose was foul-smelling, alkaline in reaction and contained ammonia, indol, skatol, phenol, and aromatic oxyacids. In other words, this was a typical protein putrefaction.

The contents of the flask containing dextrose were acid, of an appetizing odor, and contained, besides carbon dioxide and hydrogen, which were evolved, lactic acid and smaller amounts of acetic and succinic acids.

This decomposition represented a fermentation, although of not the typical lactic acid type, since gaseous products were formed in addition to lactic acid.

The simple addition of dextrose, then, has changed the type of bacterial decomposition from the putrefactive type to the fermentative type.

This protective action of the carbohydrates on the putrefaction protein is also found to hold in the case of monkeys. The addition of sugars to the diet of such animals, previously on a strict protein regimen, results in the disappearance of aromatic substances from their urine.

The explanation of this phenomenon is not as simple in the intestinal tract as in the test tube, where we are dealing with single organisms, however, and there are two distinct phases to be recognized: First, the presence of fermentable carbohydrates tends to change the character of the metabolism of the facultative bacteria from the proteolytic to the fermentative type. This in itself would eliminate from the urine the amounts of putrefactive products attributable to their activity when the animal was fed on protein.

In addition, however, there is found to be a distinct decrease both in the numbers and vitality of the obligate proteolytic organisms, accompanied by a corresponding increase in the normal intestinal lactic acid bacteria.

The addition of carbohydrate to the diet of animals previously

on a strict protein diet, then, tends to diminish intestinal putrefaction, judging from the disappearance of aromatic bodies of putrefactive origin from the urine.

These aromatic bodies are considered by most authorities to be the most available criteria upon which to form a judgment of the amount of protein putrefaction of bacterial origin in the intestinal tract, and they have been so regarded almost universally in lactic acid therapy.

If this be the case, it is perfectly possible to explain the reputed beneficial effects following the introduction of carbohydrates and of artificial cultures of lactic acid bacilli without the intervention of these bacteria at all, since the change in character of the metabolism of the facultative organisms and the suppression of activity of the obligate proteolytic bacteria as outlined above would remove from the urine the substances indicative of putrefaction.

Having thus outlined in a brief manner the salient facts governing bacterial development in the intestinal tract, it will be possible to consider more closely the specific action of lactic acid bacteria as they develop in the intestinal tract.

One of the best known and widely used sour milk organisms is *Bacillus bulgaricus*. These organisms have been shown to localize themselves in the small intestine.

On the other hand, *Bacillus acidophilus*, the most thoroughly studied of the intestinal lactic acid bacteria, is found in the large intestine.

If the supposition that proteolytic activity is most marked in the large intestine be true, it follows that *B. acidophilus*, rather than *B. bulgaricus*, would be the more efficient organism to utilize in attempts to control this proteolytic activity, since both these organisms produce considerable amounts of lactic acid in suitable media.

The lactic acid generated by *acidophilus* would be liberated in the midst of the putrefactive bacteria, while that elaborated by *bulgaricus* must be carried with the intestinal contents to the large intestine from the small intestine. Lactic acid is absorbed from the intestinal tract and burned in the body, so it is evident that the amount available in the large intestine would be problematical if the bulgarian ferment were relied upon.

In spite of the accepted idea that the seat of bacterial activity upon protein is localized in the large intestine, the writer be-

lieves that there may be very decided bacterial decomposition of protein in the small intestine as well.

This decomposition certainly takes place in experimental animals under certain conditions, and in the case studied by the writer this breakdown of protein was brought about by the symbiosis of an organism of the subtilis group acting with the colon bacillus.

Since the protein acted upon was milk, it may be interesting to outline the process.

A subtiloid bacillus of intestinal origin was allowed to grow in milk; a moderate amount of peptonization of the casein took place. A colon bacillus of similar origin coagulated the casein and produced a small amount of gas as well.

If, however, after the subtiloid bacillus had partially peptonized the milk, the colon bacillus was inoculated, there was a further liquefaction of the casein and a large volume of gas was liberated.

It is absolutely essential that the bacteria act in the order mentioned to bring about the desired result, and it is a significant fact that this same order of the two types is met with in the alimentary canal.

The symbiotic action of these two organisms, acting in definite sequence therefore, causes a greater liquefaction of the casein and the formation of much more gas than the sum of their separate activities.

This action is prevented by the presence of fermentable sugar and lactic acid bacteria, since this process is largely proteolytic, and proteolysis cannot take place in the presence of rapidly developing lactic acid organisms.

From what has been stated above, we may summarize the effects of lactic acid therapy as follows:—

(1) Objectionable proteolytic activity resulting in the absorption by the host of aromatic substances derived from protein decomposition by the action of proteolytic bacteria may take place in the intestinal tract.

(2) These aromatic compounds may be formed in the small or large intestines by the facultative or obligate proteolytic organisms.

(3) An excess of protein in the diet of the host, or any factor causing stasis or impaired absorption of protein, appears to be the direct cause of this condition. The result is an unusual amount

of available food, which stimulated the development of these proteolytic intestinal organisms.

(4) The addition to the diet of easily fermentable carbohydrate, together with the restriction of the protein, is of material assistance in reducing the output of these putrefactive products in many instances.

(5) The beneficial action of the carbohydrate is a twofold one. First, the character of the metabolism of the facultative organisms tends to change from the putrefactive to the fermentative type, eliminating from the urine the putrefactive products referable to their activity; and, secondly, the lactic acid bacilli, either those given by mouth or those normally present in the intestinal canal, or both, proliferate rapidly, forming considerable amounts of lactic acid from this carbohydrate and inhibiting the further development of the obligate proteolytic organisms by rendering the medium in which they are growing unsuitable for continued development.

(6) The proteolytic bacteria may be producing their harmful effects either in the small or large intestine: in the former case the introduction of organisms of the bulgarian type may be reasonably expected to be of benefit, since we have seen that they tend to localize themselves in the small intestine. If, however, the proteolytic process is of large intestinal origin, the normal lactic acid bacilli of the acidophilus type are indicated. If there is reason to suspect that these normal intestinal lactic acid bacilli are enfeebled in their action, or absent, it will be necessary to feed fresh cultures by mouth or introduce them per rectum.

(7) While the primary object in introducing lactic acid bacilli is to inhibit the objectionable acidity of proteolytic organisms, it is possible and, indeed, experiments seem to indicate, that in addition to the formation of lactic acid other products associated with their development may be formed which also act beneficially. The nature of these products and the character of their beneficial action, however, is not definitely known.

In young children, more particularly those fed upon cow's milk, we may conceive of three distinct types of bacterial activity of an undesirable nature in the alimentary tract:—

(1) A true proteolytic type, characterized by the formation of putrefactive products, such as indol, phenol and oxyacid.

(2) A mixed putrefactive and fermentative process in which proteolytic and facultative organisms act symbiotically, producing

through their symbiotic activity considerable amounts of gas, and destruction of protein (casein). An example of this kind has been mentioned in which the colon bacillus and an organism of the subtilis group energetically destroyed milk.

(3) A true fermentative type, in which there is an unrestrained overgrowth of true lactic acid bacilli. Salge has shown that in certain of his cases an enteritis resulted when the normal intestinal lactic acid bacillus of the acidophilus type proliferated to an unusual degree.

One not infrequently sees indications of this in infants whose diet has been for some time composed largely of malt-soup or similar preparations. There is developed a gradually increasing intolerance for this food, and bacteriologic examination of such cases not infrequently reveals the fact that *B. acidophilus* is present in greatly increased numbers.

Our knowledge of the whole subject of the application of bacteria in intestinal therapy, however, is still far too fragmentary to warrant a discussion of the treatment of these cases. All that can be legitimately done, and all that this paper hopes to accomplish, is to bring together, to analyze and to summarize our present knowledge of this subject.

DIPHThERIA OF THE INTESTINES.—McKeechie (*Montreal Medical Journal*, August, 1909) records the case of a girl, aged six years, who left Fiji for Germany. Shortly before leaving she was attacked with apparently mild dysentery. The condition persisted during the voyage of two and one-half weeks, but was held in check by treatment, though the stools were small and frequent and contained blood, mucus and pus. Enormous quantities of streptococci were found to be present, and these disappeared under treatment with streptolytic serum, but the symptoms did not abate. Finally cultures showed bacilli of the diphtheritic type. Antidiphtheritic serum was then used with immediate improvement, and two days later a complete cast of the bowel, about four inches in length, was passed. The child made a slow but good recovery. The cast microscopically was a true diphtheritic membrane. The knee-jerks were noticed to be absent, and later paralysis of the sphincter ani occurred, so that for two weeks there was incontinence of feces.—*British Journal of Children's Diseases.*

TETANISM.*

BY HERMAN B. SHEFFIELD, M.D.,

Instructor in Diseases of Children, New York Post-Graduate Medical School and Hospital, Visiting Physician, Children's Department, to the Yorkville (Beth-David) Hospital, etc.

This term is intended to denote a peculiar form of more or less continuous muscular hypertonicity occasionally observed in



FIG. 1—Showing characteristic posture of "tetanism."



FIG. 2—Illustrating persistence of rigidity of muscles.

infants under three months of age. The spasmodic affection is probably due to gastrointestinal intoxication, since the infants

* A similar (perhaps the same) spasmodic affection has been described by Hochsinger as "myotonia of the newly-born and nursing." This term is chosen in view of its being confounded with "Myotonia congenita," which is an entirely different disease.

suffering from it are almost invariably bottle-fed, greatly reduced in vitality (are often premature or syphilitic), and subject to marked gastrointestinal derangement. The onset of the spasmodic condition is fairly rapid. When fully established the posture assumed by the patient (see Fig. 1) is pathognomonic. The head is moderately retracted, the facial muscles are contracted, the jaws are firmly set together, the forearms are flexed upon the arms, and the hands are tightly clinched so as to form firmly closed fists. The rigidity of the lower extremities is less pronounced. As a rule, the legs are bent angularly, and the feet either overlap each other or are strongly arched. The spasm occasionally remits slightly, the muscular hypertonicity, especially of the extremities, never subsiding entirely (see Fig. 2). The hypertonicity increases on handling the baby, but it does not interfere with nursing. By bearing in mind the aforementioned symptoms it can be readily differentiated from trismus (patient unable to nurse), tetany ("triad of tetany"), pseudotetanus (older children, marble-like contraction of individual muscles), and eclampsia (loss of consciousness). With improvement of the general health the spasticity gradually disappears after a few weeks.

127 West 87th Street.

THE NATURE AND MODE OF INFECTION OF THE POLIOMYELITIS VIRUS.—Römer and Joseph (*Münch. med. Woch.*, May 1, 1910) state that virus of poliomyelitis, which had been preserved for five months in undiluted glycerin, when injected into monkeys was shown not to have lost its virulence, or even to have had its virulence lessened. They then discussed the relation of gastrointestinal symptoms to etiology and show that in monkeys the diarrhea is simultaneous with, not antecedent to, the paralysis. On the theory that the intestinal symptoms, rather than being the cause of the disease, might be the result of the excretion of the virus through the bowel, they injected a monkey intracerebrally. Three days after the simultaneous appearance of general symptoms of illness, onset of paralysis, and occurrence of diarrhea, the animal died. At autopsy the mesenteric glands were found greatly enlarged. These glands injected into a healthy monkey produced paralysis.—*Medical Record.*

SOCIETY REPORTS.

THE NEW ENGLAND PEDIATRIC SOCIETY.

Eleventh Meeting Held Saturday, May 21, 1910, in the Boston Public Library.

THE DIETETIC AND HYGIENIC TREATMENT OF DELICATE CHILDREN BY THE CLASS METHOD.

DR. W. P. EMERSON read this paper. (See p. 609.)

DR. MORSE.—I think Dr. Emerson is to be congratulated for showing us a practical method of applying the attention to details which we all, I suppose, give to our private patients, to a larger number of patients in dispensary practice. So far as I know his record tonight is unique. It certainly points out an entirely new field. I was a good deal interested in what he said about the children not doing as well when they went away to the country in the summer. That, I believe, has been the experience of the French when they have sent children away from Paris to the country in the summer. These children almost always came back in poorer condition than when they went away. This was attributed to the facts that they were not so carefully supervised, that their food was often not as good as they had been getting at home, and that they often had to work harder than they did at home.

DR. MURPHY.—There is one point concerning the class system which I would like to speak about, and that is the one to which Dr. Merrick has already referred. I think Dr. Emerson has indicated work in a small way which might be done in a very large way with gratifying results. Hygienic measures now employed in the public schools fall short of the mark. I think the very fact that we show gain in weight in many of the children who are attending the tuberculosis class at Franklin Park is an indication that we should also adopt dietetic measures; that is, that the mothers should be taught in classes how to care for and how to feed their children. I think we are harping too much

on the open air part of the public school system and too little on dietetic measures, which should be used in every instance in order to get the best results. The children then, instead of being what we call pretuberculous, anemic and underfed, would be a great deal stronger. At the tuberculosis school at Franklin Park each child has an active tuberculous lesion in the lungs or gives a positive von Pirquet reaction. In many cases we get positive sputum. All are benefited by the open air treatment, but it is the proper feeding of the children which is doing so much in helping them along. I think that the class method which Dr. Emerson has used as applied to the mothers of the children is an excellent thing. If we could have open air rooms in the public schools on the roof, or some other place, joined with a class system of teaching mothers how to prepare food and properly feed their children, we would make a long stride in the right direction.

DR. HASTINGS.—I should like to ask Dr. Emerson if he had any difficulty in getting the children to take the milk. In private practice children often say they do not like milk and will not take it. Dr. Emerson said in his paper that only those who did take the milk made the gain, and I would like to ask if among the children of the poorer classes he has experienced any difficulty in getting them to take it.

LACTIC ACID BACILLI. WHAT THEY ARE AND WHAT THEY ARE SUPPOSED TO DO.

DR. ARTHUR I. KENDALL read this paper. (See p. 613.)

DR. MORSE.—There are a number of points in Dr. Kendall's paper which, it seems to me, deserve special emphasis. One of them is the influence which the food has in modifying the intestinal bacterial flora. We are all very likely to forget not only this fact, I think, but also that it in many, if not most, instances renders the administration of bacterial cultures unnecessary. Another very important point is that the Bulgarian bacillus and other organisms of the same type act only in the small intestine and can be expected to do good only when the difficulty is located there. A most important point is that these lactic acid bacilli may do harm as well as good. Consequently, if we use them in a routine way, giving them freely in nearly every case, as so many do, we are perhaps just as likely to do harm as good. Judging

from my own experience, it is impossible to determine from the clinical signs and symptoms in what case they are likely to do good and in what case they may do harm. Another point which has been called to my attention pretty strongly recently by cases that have come to me after treatment by other physicians is that a good many physicians are attaching too much importance to the presence of indican in the urine. Some of them are making diagnoses of serious intestinal lesions and giving most unfavorable prognoses simply on this basis, drawing conclusions which, it seems to me, are entirely unwarranted.

DR. TALBOT.—This subject is particularly interesting to me, as I have been studying the effect of the various food components on the digestion of infants from the chemical point of view, and I believe that bacteriology explains certain things which chemistry does not explain that we observe in the feeding of sick babies and babies whose powers of digestion are lowered. It is perfectly conceivable that an overgrowth of certain bacteria which were otherwise normal inhabitants of the intestinal canal may have a harmful influence on digestion. The whole subject is so complicated that it is impossible as yet to draw broad conclusions.

THERAPEUTIC USE OF SEA WATER IN INFANTS.

DR. ROBERT M. MERRICK read this paper. (See p. 593.)

DR. HASTINGS.—Quite a number of these cases came under my care because I came on duty the first of January, Dr. Merrick's service ceasing in December. I am a little annoyed to see that the children who did well in the pneumonia cases did so before I came on duty. Certainly after I came on duty and carried out the treatment as Dr. Merrick had started it, I was not impressed with the effect that the sea water had on them. I started a parallel set of cases, giving them salt solution, but after discussing the matter we found the amount of material was too small for that, and we thought it would be better to try and get 50 cases and see what would be the result with this treatment. One interesting thing—perhaps you caught it as Dr. Merrick read his paper—was the case of edema, which seemed an effect from the subcutaneous use of sea water at first, but was relieved by doubling the dose. This was done at Dr. Leary's suggestion. I do not know any explanation of this and did not understand it at all at the time.

The class of cases at St. Mary's Infant Asylum which interests me most and baffles me most completely is these inanition cases, and after reading Dr. Simon's description of the wonderful results which would certainly come from the administration of sea water, and having tried all the different methods on successive sets of children and finding them steadily going to the bad, no matter what we did, I was quite enthusiastic to try the sea water treatment. This is the second set that Dr. Merrick reported, and you will see that they all did badly just the same whether they had sea water or not. After such a lecture as was given by Dr. Simon, in which he made such extraordinary claims both for the infectious diseases and for the inanition cases, it seems to me that such an investigation as Dr. Merrick has carried on ought to have a good deal of weight with us and help to eliminate undue authority which might otherwise be accepted from the words of a man who speaks with so great positiveness. Personally, I want to try the salt solution and give it in a similar series of cases and see whether we will not have just as good results, perhaps better, from the use of the normal saline solution as we do from the use of the fluid which the Frenchman thinks is "that out of which all animal life came."

WHOOPIING EXPIRATION AN EARLY SYMPTOM OF TUBERCULOSIS IN INFANTS.—Schick and Sluka (*Wien. klin. Woch.*, February 3, 1910). The author calls attention to the whooping nature of expiration in infants who later develop signs of tuberculosis. In 20 of the 36 children in whom he noted the sign, it first attracted attention when the infants were between two and four months old; the others were between four and ten months. In 5 other cases the children were from one to five years old, and in their cases the symptom was caused by pneumothorax or compression of the air passages from various causes. Seven of the 36 infants presenting this sign are still living and the fate of 7 is not known; the others have died. The author regards this as a striking and valuable diagnostic symptom of a tuberculous process in the bronchial glands in early infancy. It excludes other affections which might suggest tuberculosis—croup, asthma and bronchitis, in which the whooping sound usually occurs during inspiration.—*Post-Graduate*.

THE PHILADELPHIA PEDIATRIC SOCIETY.

June 14, 1910.

CHARLES A. FIFE, M.D., PRESIDENT.

DOUBLE DECAPSULATION OF THE KIDNEY.

DR. E. B. HODGE again showed the girl upon whom double decapsulation of the kidney had been performed three years ago, as little is known about the late results of renal decapsulation. Double decapsulation was done three years ago for acute nephritis which did not yield to medical treatment. The immediate result was most gratifying, and when shown before the Society last year she had been in good health for a long time and urine was free from albumen and casts upon repeated examination. How slight was the margin of safety, however, her recent history well shows. Last November she had bronchitis, which was neglected, and when I saw her there was, in addition, marked edema of face and extremities, with scanty high-colored urine. She was then admitted to the Presbyterian Hospital. Now her condition is good, but it is a grave question how long it will be before another infection will prove too much of a burden for her crippled kidneys. That the operation saved her life, I feel sure. We may soon have to face the question of repeating it.

DR. FIFE said that this case had been admitted to the Presbyterian Hospital in November, 1909. She had kept well since the operation until about three months before admission, when she became dropsical. The edema at this time disappeared in nine days. She was then well until a week before admission, when she caught cold, and immediately eyelids, abdomen and legs became edematous. On admission her eyes were completely closed, face was puffy, as was the integument of the chest; abdomen was enormously distended by ascites, vulva markedly edematous and thighs and legs decidedly "water-logged." The urine passed in the first twenty-four hours was estimated to be about 4 ounces, and contained albumen, pale granular and hyaline casts and a few leukocytes. The heart was enlarged, especially to the left; second sounds were accentuated; no murmurs. Systolic blood pressure was 120 mm. Lungs were negative; no pleural effusion. Her condition remained unchanged for ten days, the highest urinary elimination being 10 ounces. On the twelfth day this increased

to 28 ounces, the edema began to subside and in two more days had practically disappeared. She then passed 45 to 50 ounces of urine. She was discharged five weeks after admission, in good general condition, though the urine still contained a trace of albumen and a few pale granular and hyaline casts. There had been nothing in the treatment worthy of special mention.

In two weeks she was readmitted with another attack of bronchitis, with edema almost as extensive as before. Urine was again reduced to 4 or 5 ounces a day. In three weeks swelling and ascites had disappeared. She remained in the hospital until April, and when discharged her urine was normal. Two weeks later she was readmitted because of anasarca and suppression of urine, and was again discharged June 7, 1910. In the two attacks which Dr. Fife saw, the patient was comatose and in a most desperate state. He had no idea that she could survive either of them. Because of the marked suppression of urine, the ease with which it was produced and relieved, because of the gravity of the symptoms and the history of operation and the conditions preceding it, the case is of unusual interest.

NOMA FOLLOWING TYPHOID FEVER.

DR. JOHN SPEESE reported the history of a child, eight years old, admitted to the Children's Hospital with typhoid three weeks before. Attention was directed to the condition of the mouth by the gangrenous odor of the breath, and inspection of the inner surface of the cheek disclosed an ulcerative lesion the size of a dollar, which was surrounded by a zone of induration. Externally to this area the skin was red and shining. Gums and tongue showed spots of ulceration and several loose and necrotic teeth were present. Regarding the condition as an ulcerative stomatitis, which was becoming gangrenous, Dr. Speese curetted the diseased area to limit the spread of the gangrene. After removing all necrotic tissue, the raw surfaces were swabbed with nitric acid. After treatment consisted in stimulation and frequent applications of local antiseptics. Recovery resulted in six weeks with very slight deformity. Microscopic examination of portions of tissue removed by the curet showed streptothrix. The case demonstrates the danger of necrotic teeth, through which the streptothrix probably found entrance to the tissues. Prompt operative interference is necessary in such cases to limit the gangrene. Particular attention should be directed to the after treatment, to the use of local anti-

septics and to the measures necessary to support the patient through a prolonged septic infection.

DR. FRANK CROZER KNOWLES exhibited the photograph of a fatal case of noma. Two years ago an epidemic of measles occurred at St. Vincent's Home, when several cases of noma were observed, all of them ending fatally. This photograph was taken the day before death, six days after the start of the gangrenous process. Crandon, Place and Brown (*Boston Medical and Surgical Journal*, April, 1909) give a thorough account of 7 cases of noma developing during an epidemic of measles, 2 of which recovered. According to Kaposi and Port the mortality from this disease is 75 per cent. Rilliet and Barthez found 95 per cent. fatalities among 21 cases. According to Osler it occurs after measles in about one-half of all cases.

CEREBRAL PARALYSIS.

DR. FRANCIS B. JACOBS reported the history of an Italian boy, now four years old, who was observed first when seventeen months of age. He was born by the breech, with a midwife in attendance. At seventeen months he showed rickets and was suffering from pseudoleukemic anemia of infancy. At twenty-one months he tried to walk, and at twenty-four months could walk only with assistance. He finally began to walk alone at twenty-six months. When thirty-one months of age he had convulsions, after which time some asymetry of the face and head and paralysis of the left arm and leg were noted. Movement of the left hand improved under massage; he could then walk without assistance again, but his gait was typical "scissors" gait. When three years of age he had another convulsion, since which time he has become worse, now showing distinct mental impairment. The anemia appears to have disappeared entirely by this time. The table of blood counts, extending over two years, showed the apparent recovery from the anemia.

ON THE LOSS OF VACCINAL IMMUNITY IN CHILDREN UNDER SEVEN YEARS.—Serrière (*Jour. de Méd. et de Chir. Prat.*, 1909, p. 542) successfully revaccinated 91 children below the age of seven years, and therefore thinks that during an epidemic of small-pox a general revaccination of all school children is indicated.—*British Journal of Children's Diseases.*

MISCELLANEOUS.

FIRST ANNUAL MEETING OF THE NEW JERSEY STATE PEDIATRIC SOCIETY.

The first annual meeting of this Society was held in the Hotel Chalfonte, Atlantic City, June 27, 1910, the President, Dr. Henry L. Coit, presiding.

The officers were: President, Dr. H. L. Coit, Newark; Vice-President, Dr. Alexander McAlister, Camden; Treasurer, Dr. B. V. D. Hedges, Plainfield; Secretary, Dr. M. J. Synnott, Montclair. Council: Drs. J. Finley Bell, Englewood; Thomas N. Gray, East Orange; Burdette P. Craig, Jersey City; Emery Marvel, Atlantic City, and F. H. Glazebrook, Morristown.

There was a large attendance of the members and also of other physicians. The opening session was held in the morning, when the routine business of the Society was transacted, and three new members elected. At the afternoon and evening session the following fourteen papers were presented in addition to the presidential address by Dr. H. L. Coit, on "Factors in the Conservation of Child Life"; "Treatment of Typhoid Fever, with Special Reference to the Use of Hydrochloric Acid," Alexander McAlister, M.D.; "Acute Nephritis in Children," Arthur W. Bingham, M.D.; "The Status of Children's Wards in General Hospitals," J. Finley Bell, M.D.; "Some Points in the Diagnosis of Pleuritic Effusion in Infancy," D. J. M. Miller, M.D.; "The Relation of Orthopedic Surgery to Pediatrics," Sidney A. Twinch, M.D.; "Infant Mortality in Summer: How to Conduct a Successful Campaign Against It," Arthur Stern, M.D.; "The Dietetic Management of Children During Sickness," Floy McEwen, M.D.; "A Method of Dealing with Illy-nourished Infants," Francis H. Glazebrook, M.D.; "Malarial Fever in Children," Elmer C. Wherry, M.D.; "A Present-day View of Infant Feeding," Thomas N. Gray, M.D.; "Practical Points in the Management of Poliomyelitis and Its Sequelæ," Prof. Henry Ling Taylor, M.D.; "Tuberculous Peritonitis in Children," John H. Bradshaw, M.D.; "Infectious Arthritis," Davis T. Bowden, M.D.

After the evening session a reception was held by the President and Mrs. Coit for the members, their families and friends, which was largely attended and greatly enjoyed.

CURRENT LITERATURE.

ABSTRACTS IN THIS NUMBER BY

DR. S. FELDSTEIN.

DR. FRITZ B. TALBOT.

DR. S. W. THURBER.

DISEASES OF EAR, NOSE AND THROAT.

WISHART, D. J. GIBB: OBSTINATE STENOSIS OF THE LARYNX FOLLOWING DIPHTHERIA. REPORT OF 2 CASES. (*Annals of Otology, Rhinology and Laryngology*, June, 1910, p. 335.)

CASE I. Girl of eight years. Laryngeal diphtheria November 17, 1907. Was intubated the next day and tube removed on the 23d, but reintubated on the 26th and tube removed December 2d and patient discharged as cured on the 24th. January 27th the child contracted a cold and developed such dyspnea that she was intubated and tube left in for four days. On the 6th of February the child entered the hospital with extreme laryngeal dyspnea, and it was found so difficult to introduce even a two-year size tube that the trachea was opened. By forcing the vocal cords apart through the tracheotomy wound, an eight-year tube was finally inserted and good progress was made for twenty-six days. She was extubated at this time, but it was found necessary to reintubate in a few hours. This tube was coughed out shortly, but she was able to breathe under a steam tent and went along for fifteen days with some dyspnea during sleep. On March 18th (one hundred and twenty-third day) violent dyspnea again developed and unsuccessful attempts at intubation resulted in having to open the trachea. Fourteen days after, her tonsils and adenoids were removed, and on May 5th (one hundred and seventy-first day) reintubation was attempted, but prevented by spasm. Abduction and adduction of the cords were present. On June 23d tracheal tube was removed, but intubation became necessary at intervals until July 14th (the two hundred and thirty-first day). She was discharged on the two hundred and fifty-fourth day, with good power of phonation, but with a husky voice. When seen three months later there was labored respiration, husky voice and poor abduction of the cords.

CASE II. Girl of two and one-half years. Had been suffering from supposed croup for ten days. Intubated on October

22, 1908. Extubated at end of twenty-four hours, but reintubated six hours later. On the eighteenth day, the child having been so free from discomfort, the nurse pulled out the tube, and in two hours, on reinserting it for extreme dyspnea, the child stopped breathing and the trachea was opened and artificial respiration was ultimately successful in restoring animation. On the forty-first day the culture reports were negative and the tracheal wound was closed and an intubation tube inserted. On the fifty-fifth day the vocal cords were found to be covered by white patches and the trachea was again opened. This tube was replaced by a shorter one on May 25th (the two hundred and twenty-seventh day) and fibrolysin was injected at regular intervals. The child passed through the summer well, but began to have dyspnea in September, when a marked stenosis was made out by the direct laryngeal examination. Further operative measures were refused by the parent, and the child died shortly after.

S. W. THURBER.

SURGERY.

BAUNEL: A CASE OF VESICAL CALCULUS IN A CHILD OF FIVE YEARS. (*Annal. de Med. et Chirg. Infant.*, June 15, 1910.)

Baunel reports a case of a child which had difficulty in micturition and had had certain symptoms of hematuria. At one time there was complete urinary block. The diagnosis was made by obtaining a sensation of "ballottment" when the child was sitting up.

FRTZ B. TALBOT.

MCCOY, JOHN: REPORT OF TWO CASES OF BRAIN ABSCESS IN THE FRONTAL LOBE, SECONDARY TO ETHMOIDITIS AND FRONTAL SINUSITIS. (*Annals of Otology, Rhinology and Laryngology*, June, 1910, p. 287.)

First case in a boy of eighteen months, with a negative family history. Had been in good health until six weeks ago, when he developed pneumonia, which lasted seven days. At the end of this time both upper eyelids became swollen and incision showed pus on both sides. These wounds were dressed for six weeks, pus always being present. Edema of the forehead was now noticed and the case came under the care of the author. Probing

revealed a fistula to dead bone, and intranasal examination showed both middle turbinates swollen and tightly wedged in the olfactory fissure. X-ray examination showed an area of osteomyelitis over the frontal bone as wide as the distance between the outer angles of both eyes and extending almost to the vertex of the skull. The frontal and ethmoid sinuses were exposed on both sides by the open operation and the extensive necrosis of the frontal bone removed. For three weeks the patient did very well and all wounds were healing kindly. He then had an attack of vomiting, became drowsy and a weakness of the right arm and leg was noticed. In two days there was complete paralysis of right arm and leg, temperature 99.2° ; neurologist thought dressings were causing pressure. Ten days after this, vomiting and coma; child taken to hospital and old wounds opened and epidural abscess found over frontal lobe on left side. Pneumococcus found in pus and child died the next day.

Second case, a boy of ten years, no recent illness. On July 25, 1909, began to have pain over left eye, the lids of which became swollen after five days. On August 13th the left frontal sinus was exposed by a Kilian incision and considerable pus evacuated. The frontal and ethmoid sinuses were curetted and a gauze drain passed into the nose through the naso-frontal duct and the outer wound sewed up. The boy apparently did very well for five weeks, but when the writer saw him, on September 20th, there was a swelling on the forehead about one-half inch below the hair line. This was incised and a large epidural abscess exposed. Until November 18th the boy had periods of feeling well, and then, after ten days or so, severe headaches with nausea and vomiting. On November 25th he had two convulsions, and the following day a large abscess was found about one and one-half inch from the surface; on the fifth day another abscess was found, and to secure better drainage a button of bone was removed from the temporal region and iodoform gauze packed through. The size of the cavity was such that two strips of gauze, one inch wide and twelve inches long, were almost all contained therein. From this time the patient gradually recovered. A review of these 2 cases leads the author to believe:—

(1) The path of infection was by way of necrosis through inner plate of frontal bone.

(2) Both abscesses went through a latent period, and the symptoms of the active stage were delayed because a certain

amount of skull had been removed, thus producing decompression.

(3) The counter opening saved the second patient.

S. W. THURBER.

MEDICINE.

TENNEY, ELMER S.: THE SPUTUM OF TYPHOID FEVER PATIENTS AS A POSSIBLE SOURCE OF INFECTION. (*Boston Medical and Surgical Journal*, July 28, 1910, p. 124.)

The writer summarizes his article as follows:—

In a study of the saliva and sputum of 53 cases of typhoid fever, several of which showed bronchial symptoms but no pneumonia or any laryngeal complications, the bacillus was not found by means of the technique employed.

Typhoid bacilli will live for at least 125 days in the saliva and sputum and can be readily transplanted from one specimen of such material to another and kept growing in it at room temperature for a long time.

These findings show that in cases of typhoid uncomplicated by pneumonia or by laryngeal involvement the typhoid bacilli are not infrequently found in the mouth. FRITZ B. TALBOT.

HOWLAND, C. A.: NEPHRITIS WITHOUT ALBUMIN. (*Boston Medical and Surgical Journal*, July 28, 1910.)

Howland concludes that no examination of the urine can be thorough unless a microscopic examination is made. This cannot be done satisfactorily unless the urine is centrifugalized. Acute nephritis may be understood with the presence of albumin, and death may occur with all the symptoms of uremia.

FRITZ B. TALBOT.

THERAPEUTICS.

SCHABAD, J. A.: THE SIMULTANEOUS ADMINISTRATION OF PHOSPHORUS, COD-LIVER OIL AND CALCIUM SALT IN RICKETS. (*Jahrb. für Kinderhk.*, July 1, 1910, p. 1.)

The author again reports on the effects of simultaneous administration of calcium with the usual phosphorus and cod-liver oil. He found that the choice of the particular calcium salt plays an important rôle. Calcium acetate produces considerable reten-

tion of calcium (20-60 per cent.), while calcium phosphate and citrate show no retention whatsoever. Calcium acetate also produces some retention of the phosphorus of the food, while the other two salts lead to greater excretion of phosphorus.

While they all increase the nitrogen in the feces, the end result, however, is greater nitrogen retention, as the urinary nitrogen is diminished to an even greater extent.

Fat absorption is markedly diminished by calcium. This fact is not entirely accounted for by the inhibitory effect of these salts on the splitting up of fat, as the total fat in the feces exceeds in amount the unsplit fat.

S. FELDSTEIN.

INFANT FEEDING.

FINKELSTEIN, H., AND MEYER, L. F.: "EiWEISSMILCH." (*Jahrb. für Kinderhk.*, May and June, p. 525.)

Abnormal intestinal fermentation is primarily dependent on the carbohydrates in the food. Fat plays a secondary rôle in the process. It is not until after the carbohydrates have partly undergone fermentation that the physiologic digestion of the fats is disturbed. The degree of the fermentation of the carbohydrates, on the other hand, is partly dependent on the concentration of the whey, in which they are dissolved, and on the amount of casein present. The authors' experiments showed that the addition of casein to a food containing carbohydrates, which had previously given rise to intestinal fermentation, brought about rapidly an improvement in the condition of the stools. This improvement was still more marked when the carbohydrates were reduced to a minimum. As in the case of the mineral salts and their ions, we here again see the important rôle played by varying combinations of the organic compounds on the physiologic functions of the infant organism.

The preliminary studies of the authors showed that an infant food, in order to be active in the removal of intestinal fermentation, should contain a minimal amount of carbohydrates, a diminished amount of salts, a normal amount of casein, and variable amount of fat.

The requirements are fulfilled by "Eiweissmilch," which is prepared as follows: A tablespoonful of Simon's essence of rennet (or pepsin) is added to a liter of milk. This is then placed

in a water-bath at 42°C. for one-half hour. It is then filtered slowly by gravity and without any pressure through a linen bag. The coagulum, which can be readily removed from the bag, is washed twice with one-half liter of water through a very fine sieve. The suspension of the curd in the water, if properly prepared, should look like milk. One-half liter of buttermilk is then added and the whole mixture boiled for ten minutes, when the food is ready for use.

Buttermilk was selected because of its small sugar content, the stimulating action of buttermilk and its keeping qualities. The preparation has a somewhat acid but pleasant taste, and is readily taken by most infants if properly prepared. On standing a fine sediment of casein forms, which, however, can readily be made to disappear by slight shaking.

The technical difficulties encountered by the authors in the preparation of this food were so considerable that they are at present having it prepared on a large scale by Philipp Muller, manager of the dairies at Vilbel and Böhlen. Repeated analyses have shown the average composition of the food to be as follows:—

Proteids	3	per cent.
Fats	2.5	" "
Carbohydrates	1.5	" "
Ash	0.5	" "

A liter contains about 370 calories.

With this food the authors have fed during the last two years about 150 babies. These included cases of dyspepsia, decomposition, intoxication, intestinal indigestion secondary to other infections, and normal newborn babies and very young infants.

In 30 of the 33 cases of dyspepsia (authors' classification) the diarrhea disappeared after three days, and the stools assumed the "fatty" type. The temperature became normal and "monothermic" in type. On account of the minimal quantities of carbohydrates present in this food there is usually a further loss of weight for a few days after the beginning of feeding with "Eiweissmilch," and the general condition during this initial period is usually not improved and may even become slightly worse. Formerly the authors gave comparatively large quantities of "Eiweissmilch" in cases of dyspepsia, but further experience showed that in the severer cases convalescence was more prolonged. At present their practice is to order tea sweetened with saccharine for six hours, followed by 300 c.c. of "Eiweissmilch"

divided in 5-6 feedings. As soon as improvement in the stools sets in, the food is increased about 100 c.c. every other day until 200 c.c. per kilo body weight are given. When the stools become formed sugar is added in the forms of Soxhlet's sugar, Liebig's extract, or Loefflund's maltose. In children over three months old flour is added at this period of convalescence. In the beginning 1 per cent. sugar, or 10 grams flour, is added; this is gradually increased until 5-6-7 per cent. are given. In the majority of the cases sugar was added at the end of about one and one-half weeks after treatment with "Eiweissmilch."

Of the 41 cases in the stage of decomposition (Finkelstein's classification), 5 died. Mortality percentage of 12.2 per cent. The feeding was begun with a preliminary twelve hours tea diet, followed by 300 c.c. of "Eiweissmilch" divided in ten feedings. In 31 of 36 cases the stools after three days assumed the "fatty" type and became much less frequent. In almost all the cases there was an initial loss of weight, the average being 141 grams during the first three days. Small doses of the food were not continued too long. Carbohydrates were added at the end of about seven days, so as to avoid the danger of collapse. The duration of convalescence was about ten weeks.

There were 16 cases of intoxication (Finkelstein's classification); only 1 resulted fatally. After twelve to twenty-four hours of starvation diet, feeding with "Eiweissmilch" was begun with minimal quantities (50 c.c. divided in ten feedings). This amount was increased by 50 c.c. daily at first, and later by 100 c.c. daily. Sugar was added as in the other forms of digestive disturbances.

In parenteric infections (where the intestinal disturbance was secondary to infection elsewhere) the beneficial effects of "Eiweissmilch" was noticeable, as its use in many cases led to normal bowel function throughout the further course of the original disease and to cessation of loss of weight.

While feeding of normal newborn and young infants was fairly successful in the hands of the authors, they do not recommend its use in private practice, on account of the difficulty of preparation and the need of constant supervision of the feeding.

In most of the cases "Eiweissmilch" was used for about eight to twelve weeks. The subsequent history of those cases fed with "Eiweissmilch," in which it could be obtained, showed no deleterious results from this method of feeding.

BOOK REVIEWS.

NEVER TOLD TALES. By WILLIAM J. ROBINSON, M.D., Editor of the *American Journal of Urology*, *The Critic and Guide and Therapeutic Medicine*, Ex-President of the Anglo-American Medical Society, Member of the American Medical Editors' Association, American Medical Association, etc., etc. Second edition. Pp. 155. Price, \$1. New York: The Altrurians, 1909.

Six of the eight stories in this little book deal with sexual matters. The other two are not properly "never told tales," but are the one an interesting description of an ideal state where crime and profligacy are not, and the other the account of how the author helped a morphine fiend to regain his honorable position and his self-respect. The never told tales proper are simple accounts, almost case records, of the tragedies resulting from ignorance or indifference to the results from venereal infection, from the bearing of too many children, and from the lack of proper education of young people in matters pertaining to reproduction. The abstract truths which they represent are familiar to every thoughtful physician and the incidents they portray might be duplicated manifold; but the manner in which the stories are told grips one's attention and memory as no abstract statement can do, and it is this which makes them remarkable. If every young man and young woman had the knowledge they represent, our commonwealths would approach much more nearly that ideal canton in Switzerland of which Dr. Robinson tells.

THE ELEMENTS OF THE SCIENCE OF NUTRITION. By GRAHAM LUSK, PH.D., SC.D., F.R.S. (Edin.), Professor of Physiology at the Cornell University Medical College, New York City. Second edition, revised and enlarged. Philadelphia and London: W. B. Saunders Company, 1909.

This is a book which requires and repays careful reading. It is not elementary and one must approach it with considerable chemical and physiological knowledge. This can hardly be considered a detriment to a work of such excellence, but it limits somewhat its circle of readers. The second edition of Dr. Lusk's work, it has been brought up to date and contains the results of

the most recent investigations in the field of metabolism. The proper comprehension of the processes of nutrition and the variations of metabolism under normal and abnormal conditions are of the utmost importance to both laboratory worker and clinician. Here if anywhere one can find the data and the conclusions obtained from experimentation on the bodily processes, and the references are so abundant and the indexes so complete that the book will serve well as the starting point for the most exhaustive survey of the whole subject. It needs little besides Dr. Lusk's name on the title page to assure the reader that the material presented has been amply verified and most carefully brought together.

BOOKS RECEIVED.

TRANSACTIONS OF THE COLLEGE OF PHYSICIANS OF PHILADELPHIA. Third Series. Volume the thirty-first. Pp. 663. Philadelphia: Printed for the College, 1909.

TRANSACTIONS OF THE AMERICAN DERMATOLOGICAL ASSOCIATION AT ITS THIRTY-THIRD ANNUAL MEETING, HELD IN PHILADELPHIA JUNE 3D, 4TH AND 5TH. Official Report of the Proceedings by GROVER W. WENDE, M.D., Secretary.

CURE OF PROLAPSE OF THE RECTUM BY TAMPONING THE RETRORECTAL SPACE.—Sick (*Zentralbl. f. Chir.*, September 4, 1909) advocates tamponing in the treatment of prolapse of the rectum. An incision is made between the tip of the coccyx and the sphincter into the loose connective tissue behind the rectum. There are no important structures to be injured at this point. The rectum is then detached up to the promontory of the sacrum, tamponed with a little gauze, and some folded gauze is introduced. The incision is closed with plaster or collodion. The tampon is removed in one or two weeks, but not until after the second or third week should the patient be allowed to defecate in a sitting posture. This technique is especially applicable to children.—*British Journal of Children's Diseases*.

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ORIGINAL COMMUNICATIONS.

SOME CLINICAL FEATURES OF EPIDEMIC POLIO-MYELITIS: PREVALENCE; TYPES; COMMUNICABILITY; MORTALITY.*

BY L. EMMETT HOLT, M.D., LL.D.,

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There is perhaps no disease whose literature has increased so rapidly in the last five years as acute poliomyelitis.

In a previous paper† published two years ago in conjunction with Dr. Frederic H. Bartlett, we endeavored to collect from medical literature all the reports of epidemics or outbreaks of this disease up to the year 1907. They numbered some 33, the total number of reported cases being 1,942, of which, however, 1,053,

* Read at the Twenty-second Annual Meeting of the American Pediatric Society, Washington, D. C., May 4, 1910.

† *The American Journal of the Medical Sciences*, May, 1908.

EPIDEMICS OF POLIOMYELITIS, 1907-8-9.

YEAR AND SEASON.	PLACE.	NO. OF CASES.	DEATHS.	MORE THAN ONE IN A FAMILY.	TOPOGRAPHY AND HYGIENIC SURROUNDINGS.	REFERENCE.	REMARKS.
1. 1907. July to October.	Vienna, Austria.	9	..			Zoppert, J. <i>Wiener Med. Woch.</i> , Vol. XLVII, 1908, p. 2593.	
2. September.	Eau Claire, Penn.	14	2	one instance of 3 in a family.		Urey, F. F. <i>Penn. Med. Jour.</i> , Vol. XII, 1908-09.	
3. Autumn.	Oil City, Penn.	50	..			<i>Ibid.</i>	
4. Summer.	Ridgeway, Penn., and vicinity.	50	4		Narrow river valley. Hygienic conditions poor.	Urey, <i>ibid.</i> , and Terriberry, J. F., <i>Long Island Med. Jour.</i> , Vol. I., No. 12, p. 490.	Season one of the dryest in history of state. 20 cases in radius of 50 miles from Ridgway.
5. Summer.	Dubois, Penn.	100	..			Urey, F. F. <i>Penn. Med. Jour.</i> , Vol. XII, 1908-09.	Pigs and chickens also affected.
6. Summer.	Lehigh Co., Penn.	9	..	2 instances of 3 in a family.		<i>Ibid.</i>	
7. July-October.	MASSACHUSETTS. Pittsfield. Boston. Haverhill.	18 36 14	.. .. ..	11 instances of more than 1 case in same family.	Hygiene excellent.	R. W. Lovett, <i>Boston Med. Surg. Jour.</i> , Vol. CLIX, p. 131.	234 cases in entire state.
8. July-September.	Oceana Co., Mich	20	..	2 instances 4 in same family. 1 instance 2 in same family.		W. L. Griffin, <i>Jour. Mich. State Med. Soc.</i> , Vol. VII, 1908, p. 49. <i>Jour. Nervous and Mental Diseases</i> Oct., 1909.	
9. July-October.	New York City and vicinity.	2,000	..			C. F. Clowe, <i>Albany Med. Jour.</i> , Vol. XXIX, 1908.	
10. Summer.	Schenectady, N. Y.	29	2		Hygiene fair. Very warm, dry summer.	H. D. Stephens, <i>Intercol. Med Jour of Austria</i> , Vol. XIII, 1908, p. 573.	Constipation a persistent symptom in most of cases. Epidemic not related to other diseases.
11. 1908. April-June.	Victoria, Australia.	135	7			R. M. Wiley, <i>Jour. Amer. Med. Assn.</i> , Vol. LII, p. 517, 1909.	Hot season and high humidity.
12. June-August.	Salem, Virginia.	25	3			Manning, J. <i>Wisconsin Med. Jour.</i> , Vol. VIII, 1909, p. 611.	29 cases traced to direct exposure. In the rest of the state 185 cases occurred same year.
13. Summer.	Eau Claire, Wisconsin.	167	25	1 instance of 5 in family. 1 instance of 3 in family.		Emerson, H. C. <i>Eastern Med. and Surg. Jour.</i> , Vol. CLXI, 1909, p. 115.	24 cases in town of Colrain. 67 cases in rest of state same year. Practically all patients in good health at the time of attack.
14. June-November.	Franklin Co., Mass.	69	5	2 instances of 3 in family. Instances of 2 in family.	752 cases occurred in river valley. Hygiene: excellent, 4; good, 17; fair, 3; bad, 17.		

15.	Whitemore, Iowa.	9	..	1 instance of 4 in family. 1 instance of 3 in family. 1 instance of 2 in family.	Sams, J. H. <i>Iowa Health Bulletin</i> , Vol. XXII., 1908, No. 5.	Numerous other cases reported to have occurred throughout northern Iowa.
16.	July-September. Northfield, Minnesota.	20	7	1 instance of 4 in family. 1 instance of 3 in family. 1 instance of 2 in family.	Strang, D. M. <i>Jour. of the Minn. State Med. Assn. and the N. W. Lancet</i> , Vol. XXIX., 1909, p. 297.	
17.	July-August. Moose Lake & Barabnum, Minnesota.	45	5	1 instance of 5 in family. 2 instances of 3 in family.	Hamilton, A. S. <i>Jour. of Minn. State Med. Assn. and the N. W. Lancet</i> , Vol. XXIX., 1909, p. 423.	Constipation and diarrhea equally common.
18.	July-October. Flint, Michigan.	30	5	1 instance of 2 in family.	Manwaring, J. G. R. <i>Jour. Mich. State Med. Soc.</i> , Vol. VII., No. 4, 1909, p. 161.	Total number of cases in this district probably 50
19.	Late Summer. Vorpommern, Germany.	51	8	No instance.	Peiper, E. <i>Deutsch Med. Woch.</i> , No. 9, May, 1910, p. 399.	No case could be connected with previous case. Many cases occurred in isolated houses in mountain districts.
20.	June-October. Westphalia, Germany.	436	66		Krause, Paul. <i>Deutsch. Med. Woch.</i> , Vol. XV., p. 1822.	General statement made that some cases traced directly to exposure to affected persons and in others the disease apparently conveyed by third party.
21.	Summer. St. Paul, Minnesota.	83	7		Hill, H. W. <i>Jour. of Minn. Med. Assn. and N. W. Lancet</i> , Vol. XXIX., No. 17, p. 639.	No evidence of contagion in these cases. Persons attacked were especially healthy individuals.
22.	Summer. Winona, Minnesota.	35	3		<i>Ibid.</i>	
23.	Summer. Lewiston, Minnesota.	10	..		<i>Ibid.</i>	
24.	Summer. Finlayson, Minnesota.	8	..		<i>Ibid.</i>	
25.	Summer. Carleton, Minnesota.	45	..		Frazer, H. G. <i>Jour. of Minn. State Med. Assn. and N. W. Lancet</i> , Vol. XXIX., 1909, p. 154.	
26.	July-September. York, Nebraska, and vicinity.	Over 200	..	1 instance of 6 cases in 1 family; 3 instances of 4 in 1 family; 1 instance of 3 in 1 family; 2 instances of 2 in 1 family.	Shidler, G. P. <i>Jour. Amer. Med. Assn.</i> , Vol. LIV., No. 4, p. 277.	Statistics for number of cases in family drawn from a detailed study of 60 cases. Most of those attacked in previously good health.
27.	Summer. Brooklyn, N. Y.	150	..	Tenement district.	Kerr. <i>N. Y. State Jour. of Med.</i> , Dec., 1909.	Epidemic occurred in a district about one by one and a half miles in the city.

or considerably more than half the entire number, occurred in the Scandinavian epidemics of 1905 and 1906. The epidemics collected in this paper were mostly of small extent, the largest one, previous to 1905, being the Vermont epidemic with 132 cases. They were widely distributed both as to time and place, reports being drawn from almost every civilized country in the world. During the past three years reports have multiplied rapidly, indicating an alarming increase in the prevalence of this disease, especially in the United States. In the appended table, for the preparation of which I am indebted to Dr. Bartlett, we have endeavored to bring the reports of published epidemics down to the close of 1909. This record cannot be regarded as complete, for in many instances writers have referred to other epidemics of which no published report has yet been made.

The Scandinavian epidemics of 1905 and 1906 were followed by the great epidemic of New York City and vicinity in 1907, in which the total number of cases has been estimated at from 2,000 to 2,500.

The same year at Schenectady, N. Y., an epidemic with 29 cases occurred. In Massachusetts an unusual prevalence was noted, with small outbreaks at Pittsfield (18 cases) and Haverhill (14 cases) and Boston (36 cases). While in western Pennsylvania four marked outbreaks were reported, at Oil City (50 cases), Du Bois (over 100 cases), Ridgway (30 cases), Eau Claire (14 cases), and other groups of smaller extent. Also an outbreak in Oceana County, Mich., with 20 cases.

During the year 1908 the disease again prevailed in western Massachusetts, especially Franklin County, where 69 cases were seen, with only 67 in the rest of the State. It also spread to the South and the West, particularly the Northwest. An outbreak in Salem, Va., was recorded with 29 cases. Several were seen in Wisconsin, the principal one being at Eau Claire, where there were 167 cases, with 185 in the rest of the State. In Minnesota an outbreak with 20 cases was reported at Northfield and another at Moose Lake and Barnum with 45 cases. In Iowa a small epidemic of 9 cases was observed at Whittemore, and the writer of this report states that "numerous other cases occurred throughout the State." From Michigan also reports came of several epidemics, the principal one being at Flint, with 30 cases. In the Northwest the greatest number of cases were reported from Minnesota: 83 cases in St. Paul, 45 in Carlton, 35 in Winona, 10 at

Lewiston, 8 at Finlayson, and many smaller scattered groups. The disease assumed such prominence as to be recognized and made a subject of special investigation by several State Boards of Health, including Minnesota, Wisconsin and Massachusetts.

The year 1909 witnessed several small outbreaks near New York; one at Staten Island, one at Ironia, N. J., and quite a large one in a circumscribed district of the Borough of Brooklyn, in which about 150 cases were seen. In Nebraska there occurred at York and vicinity one of the most severe epidemics yet observed, with over 200 cases. Besides these larger outbreaks, reports of which have found their way into medical literature, many smaller ones are known to have occurred of which it is impossible to give any detailed information.

In addition to those which have been observed in our own country there was in 1908 an epidemic in Victoria, Australia, with 139 cases. In 1909 one occurred at Vorpommern, Germany, with 51 cases, and in Westphalia there were 436 cases occurring at twenty-one centers.

Briefly to summarize the recent epidemics they were as follows:

1905 and 1906	Scandinavia, 2 epidemics, with total cases.	1,053
1907	New York City and vicinity, with total cases	2,000
1907	11 other epidemics, with total cases....	349
1908	8 epidemics, with total cases.....	520
1909	9 epidemics, with total cases....	1,018

making a total of thirty-one outbreaks or epidemics with 4,940 cases in the past five years, or more than five times as many cases as previously recorded in medical literature.

While it is certainly true that as a consequence of the greater interest in the subject, cases of poliomyelitis are now recognized which formerly might have been overlooked, still even a cursory survey of the facts above cited must convince one that a wave of infection, starting apparently from Scandinavia, is gradually spreading over this country, possibly over the world. It is hardly conceivable that such epidemics as some of those recently recorded have been previously passed over without recognition.

Types.—The next question to which I wish to ask your attention is: Has the disease known as poliomyelitis changed in type, and is there an essential difference between the sporadic and

epidemic form of the disease? Without going fully into the arguments *pro* and *con*, I wish to state my belief that there is no essential difference between the two forms of the disease except possibly in communicability and severity. The analogy to cerebrospinal meningitis is a very close one. No one I think now denies that sporadic and epidemic cerebrospinal meningitis are the same disease. This is established by both bacteriology and pathology. They differ in that the mortality of the sporadic form is lower and communicability apparently much less; in fact, it is in most instances impossible to establish any connection between cases. It seems probable that both of the differences referred to may be explained by a difference in the virulence of the infection in the sporadic and the epidemic disease.

All this, so well known regarding cerebrospinal meningitis, applies I think quite as well to acute poliomyelitis. Evidence of contagion in sporadic cases has, it is true, very seldom been found; but only recently has it been even suspected. Fatal cases of the sporadic form are however not very rare, but often, I think, wrongly diagnosed. Epidemics of poliomyelitis thus far reported have invariably occurred in the summer months, while sporadic cases, though far more frequent in the summer, are observed throughout the year. A practical demonstration of the identity of sporadic and epidemic poliomyelitis would seem to be afforded by the experiment of Dr. Flexner, who had no difficulty in transferring to a monkey the disease from the organs of such a sporadic winter case. We must I think admit that there is no essential difference between the two types of the disease, since they have apparently the same cause, the same symptoms and the same lesions.

It would appear quite evident from published statistics that the virulence of the infective agent of poliomyelitis is greater when the disease is epidemic, and that this may explain both the higher mortality and the more ready communicability then observed; in other respects the epidemic and the sporadic disease seem the same. Not only is a difference in severity seen between the sporadic and the epidemic forms, but the disease varies much in severity in different epidemics, and in the same epidemic at different times. Thus it was noted in the Nebraska epidemic that the cases were more severe and the mortality higher in the latter part of the epidemic than in the beginning. A similar variation has also been observed in epidemics of cerebrospinal meningitis,

Mortality.—It is difficult to make any statement regarding the mortality when the disease occurs sporadically. A suggestion may be obtained from the Massachusetts reports for 1907. Of 234 scattered cases reported throughout the entire state, the mortality was 5 per cent. There were included only two outbreaks of any considerable size—one of 18 and one of 14 cases. In our paper published two years ago, of 1,659 cases in epidemics, the mortality was 12 per cent. Of 14 more recent, localized epidemics which have been pretty fully reported, representing 1,209 cases, the mortality was 12.3 per cent. This correspondence is certainly very striking. The inclusion of abortive cases will modify mortality figures. In the recent epidemics their occurrence has generally been recognized, and they are usually included in the statistics. Some observers, believing strongly in the abortive form, report many such cases, others, more skeptical, include but very few. As an example of the former class Brorström may be mentioned, who reports an epidemic in Sweden in 1905-1906, with 394 cases, of which only 79, or not quite 20 per cent., had paralysis; while H. W. Hill, writing up the Minnesota epidemics for the State Board of Health, excludes all cases but those with paralysis. With this uncertainty regarding diagnosis it is at present impossible to state what the exact death rate is. In various epidemics it has ranged from 6 to 20 per cent., the average being about 12 per cent.; in sporadic cases the mortality is certainly much lower.

Abortive Cases.—The belief in the occurrence of abortive cases is of recent origin. Up to five years ago the idea would have been scouted. Cases without paralysis would unquestionably have been excluded from the classification; while cases with paralysis ending in recovery would have been, for the most part, classed as at least extremely doubtful. Clinical evidence, however, has so rapidly accumulated upon this point during the past few years that we must admit the occurrence of both these types.

The existence of cases in which complete recovery takes place even after paralysis develops has been well recognized during recent years. In the New York epidemic of 1907 numerous instances were observed and reported. This has been confirmed in the epidemics of Scandinavia and in many other places.

Cases in which there is no paralysis, or abortive cases, must be subjected to closer scrutiny. Occurring apart from an epidemic, or in a family without other cases, they would on clinical

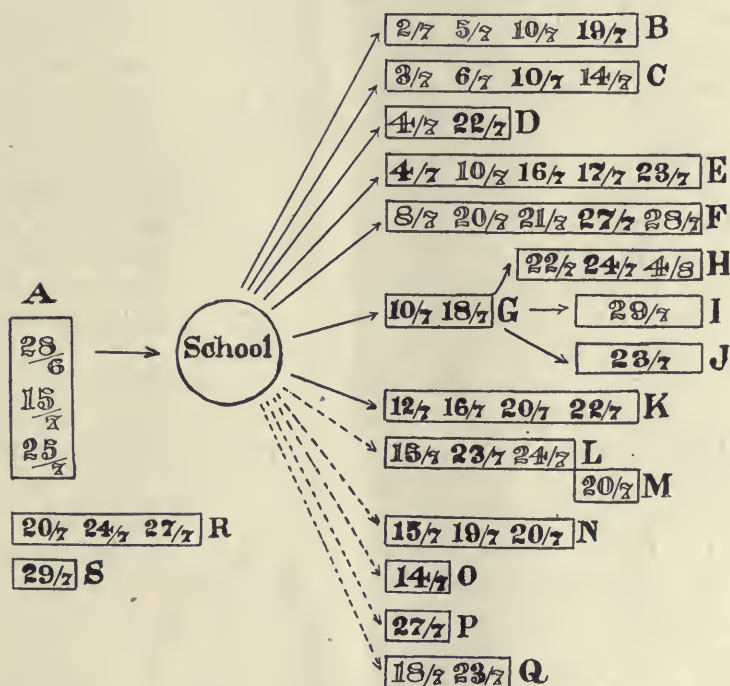
grounds properly not be accepted. But when in families abortive cases are preceded by, or are followed by, paralytic cases, and when this happens repeatedly and regularly, this type must be taken into account. Now that the infectious nature of poliomyelitis has been established, analogy would lead us to expect the abortive types just as in cerebrospinal meningitis and in other infectious diseases. There seems no doubt, from clinical observations, that they actually occur. Numerous examples occurred in the Nebraskan epidemic and in that of Tröstena, where two or more children in a family had typical attacks and others with a similar onset and early symptoms recovered promptly and completely in the course of a few days without any paralysis, while in some others only a brief muscular weakness was noted. One thing must be strongly emphasized, that at present on clinical evidence we can include as abortive types of this disease only those closely associated with the paralytic cases. It is highly probable, however, that in epidemics they do occur quite apart from such association.

The symptoms of the abortive cases, while fairly uniform, are not sufficiently characteristic to enable the diagnosis to be made of these cases when seen by themselves. The onset is usually abrupt, often with vomiting; there is constipation and fever, usually from 101° to 103° F. Accompanying these general symptoms there is very often hyperesthesia, pains in the back and neck and in many some stiffness of the neck is observed. There is general prostration, which may be sufficient to keep the patient in bed. The duration of these symptoms is usually only two or three days, after which they rapidly subside and the patients completely recover.

Occurring sporadically such cases would not be diagnosticated. They would hardly be suspected. In epidemics they would be recognized only by their association with paralytic cases. The proportion of abortive cases cannot now be stated, or even estimated. Undoubtedly a much larger number occur in epidemics than the records indicate, for most writers in their statistics have been inclined to exclude doubtful cases, in which group certainly many of these would fall. It seems probable, however, that the number is quite large. Wickman records 23 such in the Tröstena epidemic of 49 cases. In the Nebraska epidemic of 66 cases studied, Shidler states that 10 had no paralysis and 11 had only incoördination. Many of the milder cases occurring during an

epidemic would not even be seen by physicians. It is enough at present for us to recognize their existence and, I believe, their frequency. If Dr. Flexner's observations upon the cerebrospinal fluid in the early stages of the experimental disease in monkeys is confirmed by observations upon man, the status of these abortive cases will be definitely settled.

Communicability.—In our previous paper the ground was taken by us that existing evidence strongly suggested, but did not demonstrate, that the disease was contagious. Since that time



TRÖSTENA EPIDEMIC OF POLIOMYELITIS AFTER WICKMAN.

The figures give the month and day of the development of the different cases. The paralytic cases are indicated by heavy type and the abortive cases by lighter type. The lines indicate the association of the families with the school.

several important contributions have been made to this part of the subject, notably the reports of the epidemic in Tröstena, Sweden, by Wickman and that of the York, Nebraska, epidemic by Shidler.

The opportunity for a study of the spread of the disease in Tröstena was very unusual. The parish of Tröstena embraces a district of about twelve square miles. It is off the main lines of

travel and communication with the outside world is very limited. The entire population was about 500 persons, living in detached houses, which for the most part were quite isolated from each other and with very little intercommunication. In this community there occurred within a period of six weeks 49 cases, affecting thus nearly 10 per cent. of the population. The water supply of the families was from individual wells and the milk supply from separate cows owned by the different families. The food for each household was largely from the products of each separate farm. The spread of the infection seemed clearly traceable to the parish school. The relation of the families in which the disease occurred to the school and to each other is shown in the accompanying chart, which I have slightly altered from Wickman.

The first case occurred in family A. This child was taken ill June 28th, but attended school that day. The disease developed in seven families respectively on July 2d, 3d, 4th (in two families), 8th, 10th and 12th, affecting in every instance children who had been at school with the sick child in family A. They were also the first children in each of the seven families (B., C., D., E., G., F., K.) to be attacked. The only families in the parish in which association with the school could not be traced were R. and S., in one of which three persons were attacked. In families L., N., O., P. and Q. there were children who attended the school but who did not themselves develop the disease. They were apparently the carriers of the infection to their homes. Families H., I. and J. were apparently infected from G., while M. lived very near to L., and free communication existed between the households.

Another instance of the probable transmission of the disease through a third party occurred in the neighborhood of Tröstena. A child of three years with his mother visited at a home near where was also visiting a servant from another house in which 2 cases of poliomyelitis had occurred. Four days after arrival the boy came down with the disease. He was taken to his home, one day's journey distant, and from him a new group of cases developed; the boy's father in nine days, and another child in the same house in sixteen days after his return.

The Nebraska epidemic, though not so fully reported, affords many examples of direct contagion. Very striking, as in the Swedish epidemic, were here the instances of a number of cases in the same family. Thus there were 6 families with 2 children attacked, these being the only children in the family in 3 of

these; 5 families with 3 cases each, in every instance all the children of the family; 3 families with 4 cases each, these being all the children in 1 of the families; and 1 family in which every one of 6 children was attacked.

Some special groups of cases in this epidemic also afford rather striking evidence of contagion. Thus the first child in York to be attacked was a boy of five, who came down with poliomyelitis just nine days after the return of his mother and infant brother from a visit to a house in another town where was a child suffering from the disease. This seems a pretty clear case of transmission by a third party.

Next door to this first case in York lived a family with 6 children, all of whom, one after another, came down with the disease. To this household with 6 cases came a child who mingled closely with the affected children; five days later he was attacked and died in three days with bulbar symptoms.

Another series of connected cases indicates conveyance of the disease from a patient some time after the acute symptoms had passed off or possibly infection from premises. A child entered the infected district, contracted the disease and was taken to his home in the country; subsequently a twelve-year-old sister came down with the disease. "Several weeks later" an infant was brought from another town where no cases had occurred and spent the night in this house; five days after, this child was attacked. "One month later" another child came from the country to the affected house, spent a single night, and five days later developed fever, followed in three days by paralysis of both legs.

The above examples have all been drawn from cases occurring in children. Shidler narrates one group of cases in which transmission among adults seems to have occurred in the same way. A member of a threshing crew of 7 young men was exposed to the disease in a household where there were 2 cases and had a slight attack. One after another the entire crew developed the disease, which in 1 case ended fatally. The men were thrown very closely together, ate and slept together, drank from the same jug, etc.

Illustrations affording evidence of the spread of this disease by contagion might be greatly multiplied did space permit. It seems to me to be conclusively shown that this disease under certain conditions is highly contagious, demanding during an epidemic strict quarantine. It would seem, also established by evidence,

almost, if not quite, as conclusive that healthy persons may be carriers of infection, and that this may take place for a considerable time after contact with active cases. No evidence whatever is afforded by clinical reports of any medium of contagion other than contact with persons suffering from the disease or those exposed to it.

It has been my purpose in the above paragraph to emphasize the facts recently brought out which bear on the question of contagion, citing those chiefly which support this view. It should, however, not be forgotten that in a very large number of the epidemics reported, it has been impossible to trace a connection of one case with another, though careful search for such connection has been made. Thus Piper, in the Vorpommern epidemic of 1908, states that in this epidemic of 51 cases, with a mortality of 17 per cent.—this indicating its severity—there was no instance in which a case could be traced to a previous one, and no instance of more than 1 case in a family. H. W. Hill, in his report upon the Minnesota epidemic, mentions 61 primary cases and only 12 secondary cases in families in a total of 81 investigated. Thus the disease apparently varies greatly in its communicability at different times. These differences at present we are unable to explain or to reconcile.

A consideration of the recent knowledge, pathological, clinical and experimental, which has accumulated regarding this disease, makes it evident that a new name must be sought. About twenty-five years ago the common designation of "acute infantile paralysis," or "infantile spinal paralysis," was superseded by one based upon the anatomic lesion, as then understood, and since that time the disease has been most frequently called in medical literature "acute anterior poliomyelitis," which has been shortened into "acute poliomyelitis." We now know that this term is not exact, and, in fact, not descriptive, for the disease is not limited to the anterior horns, nor to the gray matter, nor even to the cord. To speak of the cerebral or bulbar form of poliomyelitis, or any myelitis, seems rather absurd. Following analogy in epidemic cerebrospinal meningitis, I venture to suggest the term "epidemic myelitis," or, better, "epidemic myeloencephalitis," as one which is fairly descriptive and preferable to the various personal names which have recently been attached to the disease.

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CHRONIC RHEUMATOID ARTHRITIS OF CHILDHOOD.*

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Rheumatoid affections of the joints in children have of late years attracted unusual attention both in England and America. The cause of this study lies rather in the obscurity of the nature of many of these affections than in their common occurrence. The term rheumatoid is not such a very apt one, as it is intended to include certain varieties of joint affections to the exclusion of others. In this paper I shall exclude from consideration all forms of joint affections which ordinarily complicate the infectious diseases or gonorrhea. Nor do I include in my study any form of joint affection which presupposes changes in the bony structures, making up the joint, as seen in syphilis or tuberculosis. There are two forms of joint affection which have lately received considerable notice, the one described by me in an article in the ARCHIVES OF PEDIATRICS under the caption of arthritis deformans, that described a short time after by Still as rheumatoid arthritis, and a third form also hinted at by Still and others, a form of joint affection closely resembling articular rheumatism, in which the swelling of the joints is rather of a subacute nature than chronic; a number of fibrous nodules occur on the tendons in the vicinity of the joints, and there is an enlargement of the lymph nodes throughout the body. In all of these forms of arthritis, "rheumatoid," if they must so be called, the course of the disease resembles very much a form of infection, though, after the onset of the joint trouble the evidences of infection, such as fever, are apt to subside and the joint swellings and other manifestations of an infection of some kind continue. Charcot, Weil, Osler, Henoch, Barlow, Pasteur have described forms of rheumatoid arthritis. The form described by Charcot and Weil and subsequently by Osler, is extremely rare and Henoch so classes this form, which closely resembles that seen in the adult, as arthritis deformans. In children the form described by the writers men-

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tioned as arthritis deformans begins in children after some exposure in a distinct infective way, and it is more than likely that it has very little relationship to the adult form, for at first in children the joints and periarticular tissues are involved, and it is only very late, if at all, that the bones and muscular tissues become affected. I think that in children what has been described as arthritis deformans so closely resembles another form, the so-called Still's form of rheumatoid arthritis, that they both are probably the same form of disease and are peculiar to children alone. I have been led to this conclusion by a study of quite a number of these cases of rheumatoid affection of the joints.

In 1896 I published a case of rheumatoid arthritis, the history of which I append. This case so closely resembles the cases which were subsequently described by Still, that to make them two separate affections would only confuse matters by an unnecessary refinement of classification.

CASE I. Girl, *aet.* six and one-half years, June 11, 1894.

Family History.—Father not well (mother did not know what the trouble was); mother well. Four children living. One child died, aged two years, of meningitis. Mother had one miscarriage at four months. The other children are well; the mother is not rheumatic, neither is the father. They have never lived in a basement and now live on the third floor.

Patient's History.—Labor prolonged; was a healthy breast-fed baby; nursed one and one-half years; first tooth at one year; walked at one and one-half years; talked about the same time. When three years old she had measles, and about sixteen months ago pneumonia, with which she was ill two weeks. She had quite recovered when present illness began.

Present Illness.—About a year ago the child was taken sick with fever; this alternated with chills and lasted two weeks. During this time she complained of severe pains in the feet. The mother says that she could ascribe no cause for the illness. The child had not been put out in the rain nor had she had damp feet. She had been sleeping on the roof during the hot nights, but had done it some time before the illness began. After the chills and fever left her the pain and soreness in her legs and feet remained. She walked still, but very slowly; she returned to school for a few days, but walking was so painful she was obliged to stop. The pain in her feet seemed to center about the ankle, which became swollen; the pain in about a month seemed to go to the

hands and wrists. They began to swell slowly; there was still pain in the feet and ankles, but not as sharp as in the hands. This had been going on several weeks, when her knees became painful and they too grew larger. The pain had always been worse at night, and would frequently waken her from a sound sleep; when quite bad she could not get to sleep again, but at other times would start up with a sharp cry several times in the night. After she had been ill two months she could not walk at all. When sick three months she was taken to the hospital, where she remained seven months. While there she contracted urogenital blenorrea, which lasted some weeks. While there the articulation of the head with atlas and axis became involved and the pain in the neck and stiffness began. The elbow joint likewise became involved. The mother said she was not certain, but thought the elbow joint was not involved at the time the child was taken to the hospital. She has been home from the hospital two months and has grown steadily worse.

Status Praes.—The child always has some pain. It varies in locality, being present sometimes in one joint, sometimes in another. She has pain when she is moved or lifted. The pain has been very bad during the last week and seems to affect especially the occipitoatlantal joint. Sometimes for several hours she cannot move the head at all without pain.

Position of child is as follows: The head is constantly in a semiflexed position; the forearms are semiflexed; extension draws on the muscles of the arms and gives a strained feeling. The legs are in attitude of semiflexion, the feet being slightly extended. The child cannot lie down, but takes the semi-recumbent position. She is very pale. The head is small; the chin pointed; the conjunctival mucous membrane is pale; the tongue is coated with thick gray coat. The teeth are twenty-two in number, the tonsils are normal. The child says that opening the mouth wide gives pain in the back of the neck, not in the maxillary articulation.

When told to rotate the head she can rotate an arc of about 20° to the right; not so far to the left; extension of the head is impossible.

The neck is normal; chest well shaped; the lungs normal. *Heart.*—Second sound at apex somewhat accentuated. *Abdomen.*—Very tympanitic. *Liver and Spleen.*—Not felt. *Articulations.*—The maxillary joint is free. At the shoulder joint the measure-

ment of two sides is the same. There is no apparent enlargement.

Movement.—The child can raise both arms above head without pain.

Elbow Joints.—Both are enlarged, palpation reveals fluctuation and also enlargement of ends of the bones. The bone enlargement begins about 5 c.m. below the joint, with a gradual upward thickening. Flexion of the forearm on the arm is good; extension is very much limited; backward movement of the arm gives pain and is very limited.

Wrist Joint.—Fluctuation is felt; the dorsal enlargement of carpal bones toward the radial side is marked, and is the shape of a hemisphere, the enlargement being more marked on the left side; flexion of hand is perfect; epiphyses of the metacarpophalangeal articulations are enlarged. Flexion is perfect; rotation very much diminished; extension the same.

Hip Joint.—There has never been any pain in the joint, but cannot get movements, as it gives pain in muscles of the thigh on account of knee-joint deformity.

Knee Joint.—There is a globular enlargement of the knee joints, slightly larger on left side, which measures $1\frac{1}{2}$ cm. more than the right. She can flex the leg on thigh, but that is the only movement possible.

Ankle Joints.—Both present diffuse enlargement, the left measuring 21 c.m., the right 19 c.m. The foot is held very stiff, adduction and abduction of foot being very slight. Movement of the toes is slight. The epiphyses of phalanges of toes enlarged.

There are no glandular enlargements. The bowels are constipated; the appetite is very poor. The respiration is 24; the pulse 96; the temperature 98° . There is slight vaginal discharge. Cover-slips show gonococci.

November 1, 1895, the movements described above have become more and more limited. Even flexion, which was present at first, is limited. The child sits and sleeps in a fixed upright attitude.

We do not lay much stress on the vaginal discharge as suggesting gonorrheal joint trouble, because the disease had practically disabled the child when she was admitted to the hospital, where she contracted the vaginal disease.

Discussion.—In this case the onset was acute in the manner of an acute infection with fever, accompanied by pain in the joints

with subsequent swelling. The joints, beginning with the ankles and larger joints, slowly became involved one after the other until the child was practically disabled. The cervical vertebrae became affected, thus demonstrating the general infective nature of the disease. Finally, the smaller joints became the seat of disease. In this case, coming under observation fully a year after the onset of the affection, the lymph nodes, spleen and liver were not enlarged. It will be shown in the cases that are to follow that the enlargement of lymph nodes, as also the spleen and liver, is seen mostly at the outset; that subsequently they may attain the normal size, or, for the most part, retrograde to the normal.

In 1897 Still described a number of cases of rheumatoid arthritis, so-called, in which most of the cases, fully half, were affected before the second dentition with fusiform enlargement of the joints. There was no redness, but the glands, or lymph nodes, in the axillary, epitrochlear and inguinal regions were enlarged. In some the spleen, in others the liver, was enlarged. Three autopsies in such cases demonstrated adherent pericardium in one case, in another valvular involvement.

Similar cases have been described by Chauffard and Raymond, also by Ballantyne and Wohlman; and in America, in 1899, by Taylor and McKim. In order to complete literary mention cases have been published by Hunt, Poynton, Mouriquand and Edsall.

The affection described by Still certainly resembles in its onset an infectious disease. It differs from the rheumatic attack by a chronic progressive involvement of all the joints, beginning with the larger and taking in the smaller joints later on, with a tendency to avoid the cardiac structures.

CASE II. The following case is illustrative of this form of arthritis:—

J. N., male, three years of age, Russian parentage. Was admitted to the hospital October 13, 1908, with a family history, which was negative. The patient had never had any exanthemata, presented no hereditary history, was healthy up to the present illness.

The present history is of ten months' duration, began gradually with pain and redness and swelling of the right ankle joint. This lasted for several weeks and then subsided, so that the child could walk and play. Since then there has been recurrences of

swelling of the right ankle, which is weak, combined with painful swelling of most of the large joints.

During the past five months the swelling of the joints has persisted; there was occasional fever, especially toward evening, accompanied by profuse sweating at night; there was no nausea or vomiting; the swelling of the joints confined the patient to bed.

During the past six months the mother noticed that swellings appeared on the neck and groin; about the elbow these swellings were painful. The child developed stiffness of the neck, combined with pain in the spine, dorsal and lumbar regions. He has emaciated considerably, his appetite is poor, the bowels are constipated, acting only with cathartics. The chief complaint, therefore, is pain, swelling of the joints, fever accompanied by sweating and emaciation; inability to move the joints or to walk; pain in the neck, dorsal and lumbar regions; swelling of the glands in the neck and groin.

On admission to the hospital the house physician's examination showed the patient to be in poor condition, pale, weak, emaciated. The head, eyes, ears, nose, mouth and teeth presented nothing abnormal. The fauces showed hypertrophy of the tonsils, otherwise negative. Larynx, trachea and thyroid were normal. Lymph nodes, posterior and anterior cervical were enlarged in packets. The supraclavicular and axillary lymph nodes very much enlarged in packets; epitrochlear in size of a large lima bean, in groups of some size, and in axillary regions the inguinal lymph nodes were very much enlarged; the lungs presented dullness, especially behind and on both sides, toward the base of the lung; diminished voice, fremitus, but no râles; the heart presented nothing abnormal, no murmur; the liver was palpable a finger's breadth below the ribs; the spleen was not palpable on account of tympanites, the abdomen was large and distended, presented nothing abnormal. There was bilateral cryptorchidism; the extremities showed marked atrophy of the muscles of the arm, forearm, thighs. Elbow joint showed a deformity, square in character, which shall be described; no limitation of motion and no crepitation; the wrist joints were swollen with a gelatinous effusion; the finger joints were not deformed; and in joints which were swollen there was no effusion; no crepitation; some fluid in the right knee; both ankle joints were uniformly swollen and effusion was present, and some considerable swelling around the joint.

The entire spine was held rigid and was very tender at time of admission. A tuberculin cutaneous test was negative. The red blood cells were 4,600,000; white cells, 29,000, of which 78 per cent. were polynuclear cells.

In consideration of the condition of the joints I made the following examination, and found the joints of the elbows, wrists, knee and ankles considerably swollen. The elbow on the right side showed a distinct sac of effusion; on each side of the olecranon process and on the anterior aspect of the joint there was an apparent distribution of fluid and a distinct fluctuation and a gelatinous sensation to the effusion. The extremities of the bones were prominent, but this was probably on account of the great emaciation. The right elbow presented very much the same appearance of effusion into the joint; anteriorly and to the left, and the epiphyses of the bone entering into the formation of the joints on both sides, appeared larger than normal, as the subsequent history showed, on account of emaciation, but were not really enlarged.

On the palmar aspect of the hand the effusion seemed to be mostly around the situation of the pisiform bone, extending down the palm of the hand; the lower end of the radius was not thickened; the tissues around the metatarsal bone of the dorsal aspect of the hand were slightly thickened; the bones and joints of the fingers were apparently normal; the knees on both sides were enlarged, and there is effusion above and below the patellar joint; there seems to be a little fluctuation behind.

Over the popliteal space the extremities of the bones entering into the joint were only apparently enlarged on account of the emaciation.

Both ankle joints were enlarged; fusiform in shape, with evidences of fluid behind and below and on both sides. The tissues on the dorsum of both feet seem thickened; the metatarsal and phalangeal joints were normal. The patient held the head rigid; the head drooped slightly forward; there were enlarged glands on both sides on anterior border of the trachea extending down to the clavicle the size of a large white bean; over the situation of the third dorsal vertebræ there was a distinct swelling about the size of a pigeon's egg, painful to the touch; over the seventh dorsal there was another swelling; at the dorsal lumbar junction there is a slightly angular deformity. The whole spine is exceedingly painful; over all the joints, with the exception of the spine,

there is very little pain; no limitation of motion, no crepitation, as though the bones or cartilages were eroded or exposed. The heart is normal.

Both wrist joints were aspirated, but nothing obtained. The needle entered into the tissues rather around the joint than into the joint itself; in other words, the joint cavity was not continuous with the swelling over the joint.

The second cutaneous tuberculin test was negative, as also the third.

October 25th. The condition is good; there is some improvement in the condition of the joints; the lymph nodes have diminished in size, especially the epitrochlears. The spine is still tender and still presents the swellings in the lumbar region, but they have apparently subsided in the dorsal region and some in the lumbar region.

The leukocyte count at this time gives: white blood cells, 25,300; polynuclears, 66 per cent.; lymphocytes, 24 per cent.; large lymphocytes, 6 per cent.; eosinophiles, 3 per cent.; basophiles, 1 per cent. Some occult blood in the stools by the guaiac test.

October 30th. The patient's general condition has improved, but the child resents any interference as far as the neck is concerned; head, too, is rigid; patient does not move the spine; some blood is passed in the movements. There is an iodid of potassium eruption on the face; the joint swellings are gradually becoming smaller. The Wassermann test proved negative, performed by Dr. Noguchi.

November 5th. Patient has steadily improved, but only up to a certain point. The swelling of the left wrist is still present to a marked degree; the tissues about the right wrist are still swollen the same as on admission; the elbow joints are markedly improved, so also the spine; the lumbar swelling has disappeared; the spine is held rigid; the ankle joints are still puffy and swollen, although not nearly so much as on admission; no pain in these joints.

The patient refuses to use the lower extremities, possibly on account of the pain.

The condition on discharge showed all joints practically in a normal condition, with the exception of a slight puffiness and increase of size in the ankle joint; the neck was still slightly rigid, but patient moved without any pain. The spine was normal,

glands have been reduced to an extent inappreciable to what they were on admission; absent in the axillary glands, epitrochlear region, neck and groin.

Patient was walking about the ward, increasing in weight and quite happy.

The temperature is worthy of note in this case. On admission the temperature ranged from 101° to 104° F., with remissions to the normal daily. After a week the temperature subsided so that it only reached 102° F. occasionally at intervals of three days, and then gradually subsided to the normal. The leukocytosis is worthy of note.

Discussion.—After the second week of the stay in the hospital the temperature fell and remained at the normal.

During the latter period of the child's stay in the hospital there were occasional rises of temperature to 101° F., with enlargement of the glands connected with the tonsils, and there was always present a slight hyperplasia of tonsillar, nasal, pharyngeal and adenoid tissues.

Another point of interest is that the leukocyte count up to November 9th remained high—20,000 on a slight rise of temperature; would fall, however, when the temperature subsided, but never during the first, second, third or fourth weeks of the illness did it remain permanently low. The polynuclear count was high also; incidentally it may be mentioned that a blood culture proved negative.

That this case bears all the marks of an infection of some kind no one will gainsay. The mode of onset, the temperature, and remissions even after months of illness, the high leukocyte count, the subsidence of the symptoms with retrogression of glandular enlargements with final evident improvement of the patient are extremely interesting, in view of the gloomy prognosis in most of the cases published by Still. The absence of any effusion in the cavity of the joint, the negative blood culture and the negative of syphilis by the Noguchi-Wassermann test are well worth more than passing notice. In this case there was some blood in the stools by guaiac test. In the case which follows there is also a history of an intestinal hemorrhage on admission to the hospital. This was not repeated.

CASE III. Male, eight years of age.

Family History.—Negative—not obtainable.

Previous History.—Measles, complicated by pneumonia six

years ago, after which hands and feet were swollen and painful for one year. Since then child has had recurrent attacks of pain and swelling of hands and feet.

Present History.—For the past eight days there has been, in addition to an exacerbation of the painful swelling of the hands and feet, swelling of the abdomen, painful defecation with passage of small quantities of blood in the stool, cardiac palpitation, dyspnea on exertion, weakness and slight fever.



RHEUMATOID ARTHRITIS IN A BOY EIGHT YEARS OF AGE.
Large and small joints affected; enlarged lymph nodes in large pockets; liver and spleen enlarged.

Physical Examination.—Child is pale, complexion pasty. Over the pelvis are several hemorrhagic spots; in the lips, herpes. There is a slight internal strabismus of right eye. Head is held in a rigid position, bent slightly forward, and any attempt to over-extend the head is resisted. Lateral motion of the head is unimpeded; normal flexion of head on chest. Over left frontal

region is a small tender prominence, probably traumatic. The child complains of pain in the tempero-maxillary region when the mouth is opened wide. The axillary lymph nodes are the size of large beans, hard, discrete, not tender. The cervical, sub-maxillary, right epitrochlear and inguinal nodes are also hard and enlarged. The sternum is markedly prominent; there is bulging of the lower portions of chest. Marked tenderness over ribs and intercostal spaces of right lower chest. No sternal tenderness. Lungs show slight dullness at both bases more on the right side, where there are a few crepitant râles. The heart is normal, except for an accentuation of the second pulmonic sound. The liver extends down to the level of the iliac crest; its surface somewhat roughened, its edge firm and extremely tender. The spleen is felt just below the costal margin; it is firm and slightly tender. The abdomen is generally tender and distended; circumference at umbilicus, 58 cm. There is movable dullness in the flanks.

The Extremities.—*Hands* show marked thickening of interphalangeal joints, particularly at the proximal joints, giving the finger a peg-shape form. The terminal phalanges are flexed. The joints are tender, but not red. There is marked periarticular thickening and distinct crepitus at the right wrist; thickening at the left but no tenderness or crepitus. *Right elbow* is held semi-flexed; it is too tender for examination. *Left elbow* also held flexed. About the joint is a tender thickening.

Knees.—Swollen, very tender. Circumference just above left patella—25 cm.; above right, 34½.

Feet and Legs.—Edematous. First left metatarso, phalangeal articulation swollen, red and tender.

Von Pirquet Test.—Negative (right and left arms).

Blood Count:—

Red blood cells	3,500,000		
Hemoglobin	68	per cent.	
White blood cells	12,000		
Polynuclear cells	63	"	"
Large lymphocytes	7	"	"
Small "	9	"	"
Eosinophiles	1	"	"

Urine.—Heavy trace of albumin; hyalin and granular casts.

Wassermann Test.—Complement fixation test—negative (Dr. Kaliski),

Stools.—Negative for blood, ova and amebæ, but during the physical examination the child passed a small blood clot by rectum.

Course.—Temperature normal on admission. Five days later it rose to 102°-104° F.; a diffuse macular eruption appeared on the trunk, front and back; the child complained of more pain in the joints, and the blood count showed white blood cells 39,000, with polynuclears 88 per cent. The temperature fell after two days, but rose occasionally to 101° F. for several weeks. Thereafter, until discharged from the hospital, the temperature remained between 98° and 100° F. By July 19th the joint pains had subsided, the neck was less rigid, and the lung signs had disappeared. The liver still remained as large as on admission. Two weeks later the child was able to walk about.

On October 26th I found the following: Effusion in both knee joints; the left knee cannot be flexed. Of the toes the right great toe is the only one affected. Atrophy of the muscles of the dorsum of the foot, and of all the muscles of thigh and leg. All the finger joints are swollen and deformed. The muscles of the hand are atrophied; also those of the forearm. There is effusion in both wrist joints. The motion in both elbows is impaired. The neck is still rigid. Liver felt 10.5 c.m. below the costal border in the mammary line; it seems to be divided off into lobes. The heart sounds are weak, but otherwise normal; no signs of adherent pericarditis. Of the lymph nodes those in the right axilla are no longer palpable, but there is still enlargement of the left axillary, of the inguinal, the epitrochlear, the submaxillary, and those in the "bicipital groove." The child has gained in weight; the face color is good. There has been no blood in the stools.

This condition was maintained until discharge, January 2, 1910. The urine continued to show some albumin and casts, both hyalin and granular. There was no further gain in weight, nor did the joint conditions improve further. Even when discharged the child was practically unable to help himself.

The treatment consisted in the administration of potassium iodid in small doses, occasionally of salicylates, of mercury by inunctions, hot baths and local applications of heat and cold to the affected joints.

Discussion.—The onset of the disease occurred after an attack of measles. It was of six years' duration, with exacerba-

tions. First the large joints and then the smaller ones became involved, and then we have the typical picture of swollen, chronically enlarged joints, rigid neck, large lymph nodes, liver and spleen, with exacerbations of the symptoms from time to time. In the intervals the leukocyte count approached the normal, and when there were exacerbations of joint pains with rises of temperature the blood count assumed the picture of a leukocytosis of the polynuclear type. In this case there was not only a history of intestinal hemorrhage, but also of a petechial and erythematous skin eruption. The patient improved up to a certain point and then the improvement ceased, the symptoms remaining stationary. Tests for the presence of tuberculous and syphilitic element remained negative.

CASE IV. Female, twenty months old; breast fed. Parental history negative. None of the exanthemata. About three weeks before her visit the mother noticed swelling of the right ankle, and a day ago the left ankle, the second phalangeal joint of the middle finger of both hands. Some fever.

Examination.—No vaginal discharge. There is a soggy swelling of both ankles, with considerable boggiess of the peri-articular tissues; there is pain on pressure. The joints above are enlarged in a fusiform swelling. The head is held rigid. The inguinal glands are enlarged to the size of large beans. No axillary glands enlarged, no enlarged liver or spleen, no cardiac lesion, no fever. The parents of the child could give no definite history of onset. The whole picture was that of rheumatoid arthritis of the type under consideration. The disease in its course was slow and sluggish. The joints remained large and but slowly grew small, and only after four months was the child allowed to stand on the extremities which, with massage, improved as to the enlargement, but after four months they were still not entirely normal, though free from pain. The acute onset, sluggish course, involvement of the large, then the smaller, joints, the enlarged lymph nodes, the rigidity of the neck, all speak for the identity of the affection in the face of negative results of tuberculin tests as with the two previous cases.

In this connection it is of great interest to note that there are all grades of rheumatoid affection, from the mild attack to the fully developed swelling of the joints described above. An example of a so-called abortive form of this infectious rheumatoid

arthritis is the following case, which came under my notice recently.

CASE V. Male, three years old, native of the United States; was the first born; father and mother were healthy, the birth was normal and he was breast fed. According to the physician the patient had rheumatism (?) six months before he was seen. After an ordinary vaccination the right large toe became swollen, then the corresponding toe in the other extremity, then the wrist on the right side, then there was swelling of the right foot, so that the patient could not walk. At times, as on the day when seen, the shoulder joint was very painful and could not be touched, and was slightly swollen. Strange to say, when the patient was seen he was in excellent physical condition; weighed 34 pounds. He had enlarged tonsils and possibly adenoids, the spleen was large and palpable below the border of the ribs; patient was pale, but there was no enlarged joints, except a distinct puffiness over the dorsum of the right foot, a little puffiness of the right ankle joints; the glands of the groin were enlarged, as also in the axilla; there was no heart affection.

In glands of axilla, groin and neck there was some swelling, and some stiffness in the joints of the neck. There was no cardiac disease. There was no fever.

In view of the history of distinct infection after time of vaccination—preceding the swelling and painfulness of the joints, with the glandular enlargement and without any characteristic picture of acute articular rheumatism, and apparently evanescent character of the swellings, few in joints, especially as none were present on the occasion of the visit, and in the presence of a very large spleen and enlarged lymphatic nodes all over the body—I surmised that we might be dealing with a case of an abortive infection, rheumatoid in nature similar to that described, when fully developed.

I put the patient under treatment, sent him back to his physician, and when seen a month subsequently the condition was as follows:—

The glands, which had been distinctly full and of large size in the axilla, groin, epitrochlears and neck, had disappeared; the spleen also had diminished in size; the stiffness in the neck had disappeared. The mother stated that there had been an occasional reappearance of the puffiness over the metatarsal joints of

the right wrist, but there was no swelling on examination at the time of the visit.

In other words, the patient seen a month before had only had two attacks of pain; his enlarged glands had disappeared; his color had returned, and he was apparently very much improved.

This would appear to prove conclusively that there are certain infections which cause a rheumatoid affection of the joints, combined with enlargement of lymph nodes and spleen, but that this infection may advance to full development of the picture described or retrograde without further serious manifestations.

That in the cases which I have described we have an infectious disease cannot be doubted, from the mode of onset, the enlargement of the spleen, liver, lymph nodes, in some cases intestinal and skin hemorrhages, the fever and the leukocytic blood picture. The slow recovery from the primary infection, with the recurrences of pain in the joints and febrile periods. The emaciation and anemia are also characteristic. Some cases which I have seen, notably that published by Manges, showed, among other things, a mild exophthalmus. The enlargement of the lymph nodes are not simple enlargement to little above the normal size, but these nodes are much larger than those seen in the adult forms of rheumatoid arthritis. The lymph nodes return to the normal size after a time and leave but slight indication of their enlargement. In my cases also the spleen retrograded to the normal, but in one case the liver remained enlarged.

I have recently seen cases of acute articular rheumatism affecting the ankles of both extremities in which the lymph nodes in the groin were greatly enlarged, but in which the remaining lymph nodes and spleen were normal in size.

There is another form of rheumatoid arthritis which occurs in children and which is exceedingly rare. It should be remembered that in this country rheumatism with rheumatic fibrous nodules is a rare disease, whereas in England it is quite common. I have recently seen such a case, in which the joints, though large and painful, were never enlarged as in acute articular rheumatism; the lymph nodes were enlarged throughout the body, but not to the extent seen in the cases described in this paper. There was no leukocytosis and little or no temperature. Scattered over the body, in connection with the fasciæ and tendons, were fibrous nodules, which disappeared after a time, and there was a cardiac

lesion and some choreatic movements of the extremities. This case was as follows:—

CASE VI. Male, nine years of age. Family history negative as to tuberculosis and rheumatism.

Past History.—Measles and pneumonia at one year. Pertussis at three years of age. No other illnesses. No previous choreic or rheumatic manifestations.

Physically and mentally well developed. Appetite and bowels good.

Present Illness.—Began gradually six weeks ago, after unusual walking exertion, when child complained of fatigue and pain in joints. Continued at school for ten days, complaining of tiredness. Feet or face never swollen. No cardiac palpitation. Three weeks ago mother noticed choreiform twitchings of face, shoulders and hands. No fever, no vomiting. Child sleeps restlessly during the night, waking frequently and suddenly out of sleep and dreaming. About three weeks ago noted stiffness of hands and inability to dress himself on account of pain in the hands. Nodules on the shoulders noticed four days before admission.

The chief complaints were fatigue, choreiform movements and restless sleeping.

Physical Examination.—General condition, fair. Some puffiness of the face. Mouth, no Hutchison teeth. Teeth and gums, fair. Tongue, slightly choreiform movements. Pallor of mucous membrane. Throat, negative. Speech not affected.

Nodes.—Anterior and posterior cervical, moderately enlarged. Submaxillary on both sides, moderately enlarged. Epitrochlear, on both sides moderately enlarged. A few small glands along brachial vessels on either side. In both axilla on both sides. Small inguinal on both sides.

Chest.—Fairly well formed. Expansion equal. Lungs, slight dullness in left suprascapular fossa and left apex posteriorly. Otherwise negative.

Heart.—Upper border second rib. Right border a finger breadth from right border of sternum. Left border a finger breadth inside anterior axillary line. Apex fifth space, $1\frac{1}{2}$ finger breadths inside anterior axillary line. Action.—Regular, rapid, fair force; soft-blowing systolic replacing first sound at apex,

transmitted to axilla, heard over entire precordium. Accentuated second pulmonic sound. Distension and pulsation of veins of neck. Pulses equal, regular, rapid, fair force.

Abdomen.—Lax, tympanitic; no masses palpable. Liver, fourth space to free border; not felt. Spleen, not felt.

Extremities.—No edema. Knee-jerks present.

Genitals.—Negative.

Rectal.—Not made.

Skeleton.—Nothing felt in bones of face. Cranium shows two small nodular exostoses on each side of occiput.

Spine.—Excessive prominence of spines of first and second lumbar vertebræ. Tender nodules in midline on sacrum. On each posterior superior spine of ilium are nodules, causing an irregularity of normal contour. Nodular deposits over spines of first and second lumbar vertebræ.

Clavicles.—Sternum; ribs, negative.

Scapula.—Four small nodular deposits along spine of the right scapula, not bony in nature, apparently adherent to the bone. Two similar deposits on spine of left scapula. Slight bony prominence over each angle over which is a fibrous deposit apparently adherent to the bone.

Humerus and Radius.—Exaggeration of normal prominences. Slight nodular deposit over right external condyle and over capitellum of right radius. Nodules over metaphalangeal joints of all fingers in both hands.

Patellæ.—Marked prominence on inner border of each patella.

Femur.—Marked prominences on condyles of both femurs.

Feet.—Proximal end of metatarsal bone prominent. Subcutaneous nodule on dorsum of right foot, apparently attached to the tendon.

No rigidity of the spine. No crepitus or limited motion in shoulder, wrist or elbow. Apparent atrophy of extensors of both forearms. Atrophy of thenar eminence on both sides. Incurving of distal phalanx on fifth finger in each hand. Flexion contracture involving middle finger on each hand and index of right hand, preventing full extension. Some tenderness and ulnar deviation of all fingers at metacarpophalangeal joints. No limitation of motion or crepitus in hips, knees or ankles. No atrophy of lower extremities.

- Synopsis: {
1. Pallor.
 2. General glandular enlargement.
 3. Cardiac lesion.
 4. Nodules on normal bony prominences.
 5. Nodules apparently connected with bursal periosteum and tendon sheaths.
 6. Atrophy of extensors in forearms with condition in hands.
 7. Puffiness of face.

In explanation of glandular enlargement: Those of neck and submaxillary region size of one-half white bean. Axillæ, one or two felt the size of a large pea. Groin, on both sides size of one-half white bean. Epitrochlear, size of pea, only two or three felt. In other words, glands or nodes palpable, but not like those in Cases II. and III.

November 23d:—

Hemoglobin	90 per cent.
White blood cells	10,500
<hr/>	
Polynuclear	65 per cent.
Large lymphocytes	6 " "
Small "	29 " "
<hr/>	
100 per cent.	

December 13th: Epitrochlear nodes still enlarged. Most of the exostoses found at first examination have since disappeared on hands and feet, with exception of bony exostoses and of occasional fibrous nodules—the nodules have disappeared. Cardiac condition as on admission.

December 30th: Good. All subcutaneous and periosteal nodules have disappeared. Lungs clear. *Heart*.—Presystolic and systolic murmurs. Action, regular, fair force, rapid. Five days ago patient had fever for two days, with joint tenderness and pain and urticarial eruption.

November 25, 1909: *One radiographic plate* of both hands shows a haziness in the contour of the heads of the third and

fourth basal phalanges of the left hand and of the 3d basal phalanx of the right hand. The same is true of the bases of the corresponding middle phalanges. But this appearance may be due to position, the boy not being able to extend this joint, in consequence of which these phalanges were not in sufficient contact with the plate.

Temperature.—Between 98° and 99° F. all the time, except for two days, about five weeks after admission. On each of these days it rose to 103° F. (102.4° and 103.8° F.) and then was again normal. (See note made December 30th.)

November 26, 1909: *Complement Fixation Test, Noguchi.*—Negative. Examined by Dr. Kaliski.

The patient made a good recovery, the motion and contour of the joints being little impaired. In three weeks there was a mild recurrence of the chorea and joint swellings, which again soon subsided. It will be at once apparent that this form of articular affection resembles closely a rheumatic attack, but differs in the fact of a general sluggishness of the process, the glandular enlargements, the chorea mild in degree, the cardiac involvement, and the nodules suggest the rheumatic infection. The case takes a mid-ground position between the acute articular rheumatic forms of arthritis and those described in the first part of this paper as a chronic infectious rheumatoid arthritis.

MORBILLIFORM RASH IN VACCINIA.—E. Gaujoux (*Ann. de Méd. et Chir. Inf.*, 1909, p. 567). A nursling, aged ten months, who had been successfully vaccinated a week previously, presented a morbilliform eruption, which was most marked on the lower limbs. The face was not affected. Temperature 99.2° F. There was no drug nor gastrointestinal intoxication, and no erupting teeth. The child was the subject of congenital syphilis, and was also affected with retroauricular eczema. Gaujoux rejects the diagnosis of syphilitic roseola, which is rare in nurslings, of slow evolution, and is always associated with glandular enlargement and mucous tubercles, which were absent in this case. The occurrence of the eruption is attributed to hepatic insufficiency and a special cutaneous irritability.—*British Journal of Children's Diseases.*

THE USE OF BACTERIAL VACCINES IN CHILDREN'S DISEASES.*

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At the outset it should be said that the credit for the technical part of the work belongs entirely to Dr. Hoobler. He made the cultures, prepared the vaccines and administered them. The cases upon which they were used occurred in the service of the children's wards at Bellevue during the past ten months. We observed them together and the conclusions reached are those of both of us.

The infections were the usual ones found in the wards of a children's hospital. The routine surgical and medical methods were employed in addition to vaccine therapy. In attempting to determine the value of this form of treatment one encounters the same difficulties that are met with in deciding as to the usefulness of certain drugs, namely, that unless a marked specific result is obtained the estimate placed on their value is largely a personal one. And until a very large number of cases have been reported and statistics tabulated, with also a sufficient number of satisfactory control cases, a correct conclusion is very difficult. It is far easier to decide upon the effect of vaccines on local infections than on general systemic infections, for the reason that in the former the process takes place under one's eyes and any improvement is readily apparent. The incidence of local infections with pyogenic organisms is also immeasurably greater than systemic infections. General systemic infections go on unobserved with only the patient's condition to act as an index of the treatment. But what renders that judgment, at the present time, still more difficult is the improvement that has taken place in the technique of blood cultures. Modern technique now renders possible the recognition of a general infection which, a few years ago, would have been undiscovered. And this greater accuracy has been developed almost synchronously with vaccine therapy. It is now the habit to

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treat almost all such infections with vaccines, and therefore we have no proper control cases, that is, cases without vaccine treatment, to tell the outcome of certain forms of general infection accompanied by relatively few organisms in the blood. Several years ago, when the methods were such as to show only an intense invasion of the blood by microorganisms, the recognition of a blood invasion augured the most unfavorable outcome. The condition of affairs is different today, but what patients with a general septicemia can accomplish without bacterial vaccines is not sufficiently clear. It seems certain, from Libman's experience with streptococcus septicemia, otitic in origin, that if the infecting focus is removed the human body may rapidly overcome the invading organisms. The difficulty in deciding as to the location and the virulence of the infecting focus has much to do with increasing the difficulties of our conclusions.

We will discuss the cases which we have treated according to the organism producing the infection.

Staphylococcus Pyogenes Aureus, Local Infection:—

The infections by staphylococcus pyogenes aureus occurred most frequently as localized superficial abscesses. The abscesses thus treated were found on nearly every portion of the body from the scalp to the feet. In several cases there was general furunculosis. The larger number, however, were isolated abscesses occurring in various parts of the body. Of whatever etiology, the majority of these localized infections yielded readily to treatment by autogenous vaccines. The number of inoculations required was usually four or five, covering a period of two weeks.

The following case of general furunculosis illustrates the very satisfactory results accomplished by the use of autogenous vaccines:—

A rather undersized girl of eleven months developed a severe case of chicken-pox. The pustules were very numerous on the face as well as on the body. Following the disappearance of the pustules there occurred a general furunculosis. The abscesses were found on the thighs, buttocks and abdomen. They were deeply imbedded and apparently began in the subcutaneous tissue and gradually worked their way to the surface. A large number of these were opened, and from some as much as a dram of pus was evacuated. Surgical treatment was continued over a period of a week, during which time about fifty abscesses had developed

and had been opened. A culture was then taken from one of the abscesses and staphylococcus pyogenes aureus isolated. A vaccine was administered every two or three days, five injections in all. Improvement was prompt and complete recovery rapidly ensued.

Staphylococcus Pyogenes Aureus, General Systemic Infection:—

Three cases are represented in our series and all 3 recovered. The clinical details of 1 of these cases is presented.

A child of five years was admitted to the hospital with a two weeks' history of tonsillitis, torticollis and swollen, painful joints. A few days before admission he began to have choreiform movements and gradually lost his power of speech. On admission he was not able to walk. Physical examination showed a faint systolic murmur at the cardiac apex; acute arthritis of the knee and elbow joints and constant movements of the face and extremities. During the first twenty days but slight improvement could be noticed. The temperature during this time was very irregular, varying from 104°F. to subnormal. Cultures from the throat and also from the blood showed staphylococcus pyogenes aureus. A vaccine was made and the first inoculation given on the twentieth day after admission. In all, five inoculations were given, covering a period of sixteen days. The child improved gradually under vaccine treatment; his temperature fell, all choreiform movements ceased and other manifestations of the infection disappeared. Without blood culture, it may be said that this case would have passed for a very severe chorea with unusual temperature, with no reason to suspect a blood infection.

Our experience with autogenous vaccines in localized staphylococcus infections has been entirely satisfactory. Their value can hardly be overestimated. In almost all instances they bring the process to an abrupt termination. Recurrences may take place, but they are again promptly controlled by inoculation. This has also been the experience of all who have written in regard to the vaccine treatment of such local infections. There can be no doubt as to their efficacy.

Very few general staphylococcus infections treated by vaccines have been reported. From our experience we are inclined to look upon such treatment with favor.

Streptococcus Infections, Localized:—

This organism has been isolated from the pus from localized abscesses, also from various cavities, such as the pleural cavity in

empyema and from the middle ear in acute otitis media. It has been our experience that local infections due to the streptococcus yield much less readily to vaccine treatment than do similar infections due to the staphylococcus. But it is also our opinion that they may yield to a certain extent. After prolonged treatment, however, we have obtained no beneficial effects in some instances, as the following case illustrates:—

J. B., aged eight months, during the course of a mild nasal diphtheria without febrile reaction, developed enlarged cervical glands. Several of these went on to suppuration and were incised. Streptococci were isolated from the pus and an autogenous vaccine was made and administered. The use of the vaccine had no perceptible influence on the course of the infection. Fresh abscesses formed one after another in the cervical region, went on to suppuration and were incised. After a prolonged trial by autogenous vaccine a stock vaccine from a case of similar infection was substituted, but no beneficial results were seen after several weeks of this treatment. The child later succumbed to a pneumonia.

Streptococcus, General Systemic Infection:—

The following case illustrates one of streptococcus infection with a favorable termination:—

S. B., a boy ten years of age, was operated on for mastoiditis. Two days later appendicitis developed, for which he underwent operation. His temperature came gradually to normal. On the seventh day after operation a sharp rise to 104°F. occurred, and thereafter his temperature continued of a septic type. On the tenth day after operation a blood culture showed streptococci. A stock vaccine was used in small doses for the next three days with no apparent result. Fifteen days after operation an autogenous vaccine was administered and repeated daily for thirteen days. The temperature gradually came to normal and remained so. Coincident with the gradual fall of temperature there was an improvement in his general condition. Complete recovery ensued.

The following also is a case of general streptococcus infection with a favorable termination:—

R. C., a boy of eight, had tonsillitis. A few days later acute otitis media developed and the ear drum was incised. From the onset of these definite infections the child had a temperature curve

of a septic type, with a rise often as high as 104°F. On the fifteenth day after the onset a blood culture was made and streptococci were isolated. A week later a second blood culture was also positive for streptococci. An autogenous vaccine was prepared, but on the day before the child received the first inoculation there developed in the right axillary region signs of a pneumonic process. On the following day, in spite of the pneumonia, the child appeared much better and the temperature was not so high as on previous days. The child was given his first inoculation on the day on which his temperature began to fall. The inoculations were repeated daily for five days. The temperature continued to fall and his general condition was greatly improved. After two weeks he was convalescent. Several inoculations were given at weekly intervals. A third blood culture, taken at the end of the treatment, was sterile. It is difficult in this case to say just what relation vaccine therapy had to recovery.

It is also difficult to tell, from the literature, what is the value of vaccines in streptococcus infections. There are not many local ones reported. It seems probable that almost all general infections with a favorable outcome are reported and few with an unfavorable termination. Further statistics are required for a definite conclusion.

General Pneumococcus Infections:—

In all, over 50 patients were treated. Most of them were small children with bronchopneumonia, but there were a number of older children with lobar-pneumonia.

Our experience has been confined largely to the use of stock pneumococcic vaccines, which were used in various ways; in small and large doses repeated daily, or at intervals of three or four days. We are not able to report any apparent beneficial results from their use, nor were there any unfavorable ones. In a few cases the pneumococcus was isolated and an autogenous vaccine made. In such cases we did not observe any better results than in cases without vaccine treatment.

Unusual Infections:—

We have treated a few cases of unusual infection with vaccines and with a favorable termination. One was a boy of nine years, who had sustained a compound fracture of the tibia and extensive laceration of the foot. The usual surgical measures were employed. The temperature was approximately normal for

a week, when it rose to 104°F. The surgical conditions became worse and the child appeared septic. Amputation was then done at the knee. The temperature did not abate; pus appeared in the amputation wound and metastatic abscesses in the upper extremities. A blood culture was negative. The pus from the abscesses showed *b. coli communis*. An autogenous vaccine was made and administered twice a week for the following four weeks. The temperature gradually came to normal and recovery took place.

Another case was a boy of three months who had had erysipelas. Following the erysipelas many local abscesses developed. During the first week they involved the left knee joint, both hands and the right thigh. During the second week abscesses developed in the forearm and right leg. The pus from the abscesses showed *b. mucosus capsulatus*. An autogenous vaccine was prepared and injected many times. The abscesses gradually healed, and one which developed in the right elbow joint contained sterile pus. The abscesses finally healed entirely, leaving no permanent deformity except a subluxation of the left knee joint. Under observation the child gained 3 pounds in weight.

Both of these children seemed distinctly benefited, and their recovery due, in part at least, to the use of autogenous vaccines. It would be unwise, however, to attach too great importance to isolated instances of recovery following such unusual infections.

Gonococcus Cases:—

It is very difficult to obtain satisfactory data regarding the vaccine treatment of the vulvovaginitis of children; first, because such cases are not willingly received into hospitals and are always sent out at the first opportunity; and, secondly, because when at home they are liable to a reinfection from the source from which their original infection was received. There is also great difficulty in following such cases over the long period of time which must necessarily elapse before a cure can be reported.

The majority of reports in the literature are unsatisfactory because the observations were made in hospitals, and but few patients were observed subsequent to their discharge. There has also been no agreement among writers as to what constitutes a cure.

Butler and Long reported 25 patients treated, with no observations after discharge from the hospital. Churchill and Soper reported 41 patients treated, 9 of them observed at a later period;

3 of the 9 had relapsed, and of the 6, who had remained free from symptoms, only 4 were seen at a period later than two months.

A. Hamilton and Cooke report 37 patients treated, but of these only 7 were subsequently observed. Four of these had relapsed within one week and the other 3 were not seen later than two months after leaving the hospital.

Thomas reported 13 patients treated, none of which were seen after leaving the hospital.

All of these writers believe that the discharge is lessened and that the gonococci are temporarily diminished or disappear. But an analysis of their figures shows that of 116 cases treated only 16 were subsequently followed (many for only a few weeks), and of these 16, 7 relapsed.

The latest and most optimistic addition to the literature on this subject is that written by B. W. Hamilton. He reports 84 cases treated by vaccines, with 76 cures and 8 failures. Nineteen of his cured patients were seen five months after the last evidence of infection had been present and were all found free from gonococci. These results are in marked contrast to those obtained by all other writers.

We have used stock gonococcus vaccines as a routine measure in the vaginitis ward of Bellevue, in conjunction with the usual irrigation treatment. Several cases in the out-patient department have been treated with vaccines alone. In many cases the combination of vaccine and irrigation treatment caused the discharge to be very greatly diminished or to disappear. But the period of observation was not sufficient to enable us to draw any conclusions as to the ultimate outcome. A few cases in the hospital treated until the discharge had ceased appeared in the out-patient department with a profuse discharge.

We have not been impressed by the efficacy of this form of treatment and believe, with the majority, that it improves symptoms but rarely effects a permanent cure.

DISCUSSION.

DR. CHURCHILL.—I would like to refer to a case of meningitis due to the staphylococcus, obtained three times from the spinal fluid by lumbar puncture, with large numbers of polynuclears. The case was twenty-one months old. The staphylococcus aureus

was obtained on three successive punctures and an autogenous vaccine made up and injected, 70,000,000 dead cocci being injected subcutaneously. Temperature fell to normal and the child made an uninterrupted recovery. The history of the case is best shown by the temperature chart which I have here. It drops to normal immediately after the use of the vaccine.

In the case alluded to by the writer we came to the conclusion that the disease was shortened by the administration of the vaccine, but beyond that we did not feel that we could say anything about it. It seems to me that the staphylococcus vaccine is the one vaccine *par excellence* with which we do get results.

DR. KOPLIK.—My experience with vaccines has been limited to two infections—that of the streptococcus and staphylococcus. In the staphylococcus infections my results agree with those of Dr. Howland. With the autogenous vaccines, in cases of multiple abscesses, the results have been very favorable, and I always use that treatment now if I can get an autogenous vaccine. With the streptococcus our results have been rather discouraging, limited to a few cases in which the vaccine was injected subcutaneously, with little or no effect.

DR. SAUNDERS.—I would refer to a case of pyelitis, such as we see frequently in infants—a child of eight years, strong and robust; had had a number of relapses. An autogenous vaccine was prepared, pure colon bacillus, and injected. The condition was improved, but not cured. Finally we injected the vaccine, together with nuclein. Before that there was no reaction; with that there was pronounced reaction, vomiting, temperature 102°F., and erythema. Eight days later it was repeated and the temperature rose to 104°F., with vomiting and more severe local reaction, and then the case cleared up.

In Heath's last edition he refers to his method of using nuclein in conjunction with the vaccine to increase leukocytosis. Generally, when I have not had good results with the vaccine alone, I have employed the nuclein by mouth.

THE EARLY DIAGNOSIS OF MEASLES.—Hecker (*Münch. med. Woch.*, October 12, 1909) has observed a great reduction in the number of leukocytes during the incubation period of measles. The change is found one to three, and sometimes even ten or eleven days, before the appearance of Koplik's spots. In addition to the decrease in the total number of leukocytes there is a relative diminution in the number of lymphocytes, which may almost disappear from the blood. These signs may prove important in children who have been exposed to infection.—*British Journal of Children's Diseases.*

THE RÔLE OF THE VISITING NURSE IN THE REDUCTION OF THE INFANT MORTALITY.

BY CHARLES HERRMAN, M.D.,

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In any attempt to reduce the infant mortality in large cities two propositions must be borne in mind. First, the younger the infant the greater is the danger of death. The mortality is highest during the first months, especially during the first few weeks. One-third of all the deaths during the first year occur in the first month of life—one-half in the first three months.

With the methods at our command at present the deaths in infants under two weeks are but slightly preventable. They are chiefly due to congenital weakness, deformities, injury at birth and constitutional disease in the parents, causes over which we have little or no control in the larger number of cases. These could only be affected by treatment of the parents several months before the birth of the infant. However, the deaths which occur between the end of the second week and the first year are, to a very great extent, preventable; and it is here that the rôle of the visiting nurse is all important. From what has been said, the necessity of seeing the mother shortly after the birth of the child is apparent.

The second proposition is that even under the most unfavorable hygienic conditions the infant mortality in the tenements is exceedingly low in breast-fed infants. This fact cannot be too frequently emphasized. A large number of mothers stop nursing for insufficient reasons. It is now pretty generally agreed that there is only one absolute contraindication, that is, active pulmonary tuberculosis; in incipient cases, if the proper precautions are taken, nursing can sometimes be continued with success. The visiting nurse should use every possible means to induce the mothers to keep their infants at the breast, especially during the summer months. Many mothers overestimate the amount of milk required by a baby. The writer has notes of a number of cases in which the mother believed that she did not have sufficient breast milk, the infant gaining in the meantime as much as 2 pounds a month.

What is the best method of reaching the mother early? It has been said that our services should not be handed to the mothers "on a silver platter." It is true that instruction which is given unsolicited is not appreciated as much as that which is sought for. Theoretically, these mothers should come to us, we should not go to them. But "it is a condition not a theory which confronts us." The fact should be emphasized that those who need the advice most are the last to seek it in the proper place. A mother who is intelligent enough to take her baby regularly to a milk depot or a dispensary to have it weighed and to receive advice is not sorely in need of help. In order to test the truth of the above statements the writer visited 50 tenement mothers, whose babies were born in the service of midwives, and asked them whether they ever took their babies to a dispensary or milk depot when they were sick. Only 10 answered in the affirmative. It is only fair to say that more than half of these mothers were Italians; but it is just these that need the advice. There are a number of reasons why they do not go; some cannot speak English and are afraid that they will not be able to make themselves understood. Others cannot spare the time; they have several other children to take care of; have to wait too long before they are attended to; still others must go out to work. Some time ago the writer made a canvass of all the infants under one year of age in the tenements of six square blocks in the immediate vicinity of the Vanderbilt Clinic. On the basis of the figures obtained, together with an investigation of the number of infants under one year brought to the Vanderbilt Clinic and the Roosevelt Hospital Dispensary, it is found that not more than one-third of the babies living in the tenements of the district are taken to a clinic or a milk depot when they are sick. A private physician is called occasionally, but when it is remembered that these people pay from six to ten dollars a month rent, it is easy to see that they cannot make use of his services very frequently. If only one-third of these people visit the clinics when their babies are sick, how many are likely to come for advice while the baby is well? It requires a high degree of intelligence to appreciate the value of prophylactic treatment. How many intelligent adults visit their dentist regularly when their teeth give them no trouble?

There are over 125,000 infants born annually in New York City. It would be impossible to visit all, nor is it desirable that

this should be done. A selection of cases must be made. The principle on which such a selection should be made is the greatest good to the greatest number that are in the greatest need. It is fair to assume that the mothers of infants born in the service of private physicians receive some instruction in feeding and hygiene. It is true that in a certain percentage of cases the instruction is incomplete or inadequate; but such a mother is much more likely to be intelligent, to have well ventilated rooms and proper food than a mother who pays a midwife five dollars for her services during childbirth. The mothers of infants born in the service of maternity hospitals receive, or ought to receive, instruction in infant feeding and hygiene. In some this is being done, and the number will surely increase. This work may safely be left to these institutions to carry out. There remain about 55,000 infants born in the service of midwives. Now it is perfectly true that there are many midwives who are fully competent to give advice to these mothers on questions of infant feeding and hygiene. It is equally true that a very large percentage are not. It is not to be expected that they should have either the knowledge or the inclination to give it for the trifling sum which they receive. A very large percentage of these mothers are ignorant and poor, many lack the necessities of life, and I feel certain that it is in this group that the most help is needed and the greatest good can be done. There is another point which ought not to be lost sight of. The midwife is engaged to assist at childbirth and during the puerperium; there her duties end; she is not expected to treat the baby afterward. The visiting nurse interferes with her in no way, and when the midwives realize this the majority will coöperate with the nurse and their coöperation will be extremely valuable. If the nurse's advice coincides with that of the midwife it is much more likely to be followed.

The visiting nurse should distribute her time judiciously; she should give her energy where it is most needed. A mother who has successfully nursed several children for one year may need only one visit a month, while an illegitimate, boarded-out, artificially-fed infant may need several visits a week. The visiting of each case at a stated interval, regardless of its needs, would not yield the best results; some babies would receive too much attention, some too little.

The proper training of the visiting nurse is a matter of paramount importance. In order to be really successful she will need

something more than a knowledge of the principles of infant feeding and hygiene. This she can obtain in the babies' ward of the hospital and in the milk depots and dispensaries, where large numbers of babies are treated. The rest of her training she must obtain by direct contact with the mothers in the tenements. There she will have an opportunity of studying their peculiarities and weaknesses, the best method of arousing their interest and the proper manner of imparting knowledge to them.

The work of the visiting nurse must not be limited to the summer months, but must be continued throughout the entire year. Proper methods of feeding render the infant less susceptible not only to digestive disturbances, but also to all other diseases. Nor is infant feeding, though the most important, the only subject that requires attention. For example, the Italians and the negroes need quite as much instruction as to the value of fresh air; a very large percentage of their babies die of respiratory diseases. Deep-rooted tradition is hard to eradicate. Even native born mothers of Italian parentage who live in Italian colonies are forced against their better judgment to continue injurious practices; they are virtually compelled to wrap their babies in swaddling-clothes for fear of being reproached by their family and friends if any sickness should occur after they had discarded them. Recent investigation has emphasized the injury that may result from such swathing, so that every effort should be made to abolish it. The main difficulty in the solution of such problems lies in the constant influx of immigrants. If this could be stopped for, say, fifteen years, all the girls who are to become mothers in the future could be instructed in the proper methods in school.

A visiting nurse should remain permanently in one district, for this gives her an opportunity to become familiar with the needs and the peculiarities of its people; and they in their turn learn to have confidence in her advice. She should have some knowledge of the language of the people among whom she works, not only because she will be better able to make herself understood, but also because they are more likely to follow her instructions. If she cannot speak their language, she should try to interest those among them who understand English, so that they may act as helpers. During the summer vacation the older girls can assist by acting as interpreters, while they themselves receive the benefit of much valuable advice for future use.

The visiting nurse should confine her attention as much as

possible to the care and feeding of infants. Some very conscientious nurses see so many other things that they would like to do that they are apt to spread their energy too much. Matters outside their domain should be referred to the proper department or charitable agency.

Since the very great value of breast feeding is universally recognized, every effort should be made to render it possible for the mother to stay at home, in order to nurse and care for her own child. When in need of proper food the visiting nurse can notify one of the charitable organizations. In some instances the mother may be able to obtain work that can be done at home.

The mortality among illegitimate and boarded babies is exceedingly high. Most of these infants are born in New York City and in the service of midwives, so that if the nurse visits the mother shortly after the birth of the child she can ascertain whether she intends to move and where she intends to place the child. In this way the cases can be followed up and given such special attention as they require.

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THE TRANSMISSION OF TYPHOID FEVER BY AN INFANT.—Rommeler (*Munch. med. Woch.*, May 3, 1910) reports the case of a woman, aged twenty-six, who, while nursing her infant, developed typhoid fever. The mother was admitted to a hospital and the baby was sent to be cared for by a friend. The child had a slight attack of diarrhea, but otherwise appeared quite well. Two weeks later the woman who was caring for the child developed typhoid fever and was soon followed by her three children, a three-year-old niece, and a twenty-year-old servant. The child was then examined and was found to give a positive Widal reaction, and on one occasion typhoid bacilli were isolated from the stools. The author draws from this case the lesson that when a nursing mother develops typhoid fever her infant should also be taken into the hospital. The symptoms of a typhoid infection in an infant are so slight that there is a great danger of a child apparently quite well conveying the disease to others.—*Medical Record.*

THE CYTODIAGNOSIS OF TUBERCULOUS MENINGITIS AND THE POSSIBILITY OF RECOVERY.*

BY CHARLES HUNTER DUNN, M.D.,

Boston.

The patient, whose illness forms the basis of this paper, was a little girl three years of age, who was seen in consultation with Dr. Herbert W. Newhall, of Lynn, on December 7th, 1908. Her father, mother and a younger sister were well. A brother of her father had tuberculosis of the spine. The previous occupant of the house in which the patient lived died of tuberculosis of the lungs.

The patient was breast-fed until nine months old, and was well until seven months old, when she became subject to intestinal indigestion, which was equally severe while she was still on the breast and after weaning, and which continued for about seven months. Adenoids were removed in April, 1907. She had, since sixteen months old, been subject to attacks of diarrhea, with mucus in the movements. Between these attacks digestion had been normal, and she had seemed perfectly well. She had a mild attack of vomiting during the summer of 1908, which was attributed to indigestion. Two weeks ago she caught cold, and still had some cough, although the cold had been improving.

On December 5th, at 2 A.M., the patient began to vomit. She was immediately given small doses of calomel, and all food was withheld, but, in spite of this, vomiting continued all day, even the smallest amount of water being vomited. At 5 P.M. vomiting ceased. During the night she was fussy and irritable, but the next morning seemed better, and played a little. In the afternoon she vomited once, and did not seem so well. Since then she had grown increasingly more apathetic. Her temperature had been between 99° and 100° F. Her increasing apathy was the most notable symptom.

On physical examination her temperature was found to be 99°F., her pulse 74, and her respiration 30. She was a well developed, fairly well-nourished child. She lay on her back with her eyes open, and took very little interest in her surroundings, not responding when spoken to, although evidently understanding.

* Read before the Twenty-second Annual Meeting of the American Pediatric Society, Washington, D. C., May 4, 1910.

She did not resist examination as she usually does. At times the expression of her eyes became peculiarly fixed and staring. There was slight ptosis of the left eyelid, and the pupils were equal and reacted normally to light. There was no trace of retraction of the head, nor of tenderness or rigidity of the neck, nor of tenderness about the ears. Breathing was slightly suggestive of obstruction in the nasopharynx, but was otherwise normal in character. The mouth, tongue and throat were normal. The heart was normal, except for a faint systolic murmur at the base. The pulse was slow, regular and of good quality. The lungs were normal, except for a few coarse, moist râles at the left apex. The abdomen, liver, and spleen were normal. The limbs were normal, showing no evidence of paralysis or spasm. The knee-jerks were both more lively than normal. The plantar reflexes were not obtained. There was a moderate Kernig's sign present on both sides. There was no ankle clonus.

It was decided that the case was strongly suspicious of tuberculous meningitis, and that the other possibility was cerebral symptoms from absorption of intestinal toxins. It was advised to give castor oil, a high irrigation of the colon, and water diet until the next day.

Toward the end of the visit the patient began to cry out at intervals as if in pain. Following these attacks of crying there was noted marked rigidity of the right hand and arm, with twitching of the right hand, which lasted several minutes.

The patient was seen again on the following day. She had had rather a bad night, with crying, and considerable twitching and rigidity of all the limbs, which at times amounted to clonic and tonic spasms. Bromides had been given to control these symptoms. She had had one normal looking movement. The enema obtained very little normal fecal matter. The temperature had not been above 100°F. She was refusing everything given by mouth.

On physical examination the apathy was more marked. The eyes were fixed, with a distinct cerebral look. There was occasionally slight internal strabismus, but the ptosis of the left eyelid was not visible. There was considerable spasm of the right arm and leg. The knee-jerks on both sides were markedly exaggerated, and Babinski's sign was present on both sides, most marked on the right. There was no ankle clonus, and no rigidity of the neck.

Lumbar puncture was then performed and 10 c.c. of very slightly cloudy fluid obtained under considerable pressure. Examination of the cerebrospinal fluid showed no fibrin formation. The cell count showed 260 leukocytes per cubic millimeter. Differential count of the cells showed the following: Polynuclear cells, 2 per cent.; lymphocytes, 96 per cent.; endothelial cells, 2 per cent. In the centrifugalized sediment, with the Löffler's methylene blue stain, no microorganisms were found, but with the stain for tubercle bacilli several small clumps of acid-fast bacilli were found, which in appearance exactly resembled typical tubercle bacilli.

In view of this examination, a positive diagnosis of tuberculous meningitis was made, and an unfavorable prognosis given.

On the following day, December 9th, the patient was seen again. During the night she was no better, having been very apathetic, with marked rigidity and twitching of the limbs. The pulse was more rapid, and at one time during the night the respiration was rapid and irregular. The temperature went up to 101.4°F. In the morning, however, the patient became much better. The temperature came down to 99°F., the respiration became normal, and all rigidity, spasm and twitching of the limbs disappeared. The child was found in an apparently normal sleep, and was not disturbed for examination.

On December 10th the patient showed a very marked improvement. She was still somewhat apathetic, and showed a tendency to sleep a good deal. But she took at times an active interest in her surroundings, and responded well. She had slept all night, and showed no spasm nor rigidity of the limbs. Her temperature was normal, her pulse 104, respirations 30. There was no spasm or rigidity of the limbs, no ptosis nor strabismus, and no Babinski. Kernig's sign was still present, although not marked, and the knee-jerks were still very lively, though not so markedly exaggerated as on December 8th.

On December 11th the improvement had continued. The temperature was normal, and the patient was much brighter. There was no notable change on physical examination. From this day, until December 17th, there was no notable change, except that on the 16th she seemed less well, her pulse for a time becoming much slower, 78 per minute and slightly intermittent. It was noted that she did not use her right arm quite as well as her left. On the 17th she seemed very much brighter, and Kernig's sign disap-

peared. Physical examination was normal, except for somewhat exaggerated knee-jerks. On December 21st the child seemed absolutely normal, except she had not yet talked. On December 28th she was considered perfectly well, and has been well ever since, except for a few mild digestive disturbances.

It is unfortunate in this case that the proof of the existence of tuberculous meningitis was not completed by injecting the cerebrospinal fluid into a guinea-pig. The possibility of recovery was not considered until a time when further lumbar puncture was not advisable. Nevertheless, the writer believes this case was actually a case of tuberculous meningitis, the evidence of the bacilli being almost absolutely conclusive, although the entire chain of proof was not complete.

The Fatal Prognosis of Tuberculous Meningitis.—Tuberculous meningitis is usually recognized as an invariably fatal disease, and an absolutely unfavorable prognosis is usually given. This fact causes this disease to be one of the most depressing both to the friends of the patients and to the physician. An absolutely unfavorable prognosis should not be given if there is the faintest hope of recovery which can be given to the patient's friends. The writer believes that even in tuberculous meningitis we are not justified in giving such a prognosis, but that we are justified in holding out some slight hope. My purpose is to bring forth what faint hope may be given in this disease.

The Diagnosis of Tuberculous Meningitis.—The diagnosis of tuberculous meningitis rests, usually, upon a triple basis; first, the clinical characteristics of the disease; second, the results of the examination of the cerebrospinal fluid obtained by lumbar puncture; and, third, the fact that death invariably occurs.

The clinical picture in this disease is admittedly inconclusive in establishing the correctness of the diagnosis. The writer has analyzed a series of 60 successive cases of tuberculous meningitis, the results of which analysis may be seen in Table I.

It appears that no one of the many characteristic symptoms and signs of the disease is either invariably present or absent, although various signs and symptoms which occur most frequently may be grouped together into our common conception of the typical case. From this typical case every sort of wide variation is frequently to be met with. The onset may be sudden or gradual, the temperature may be high, moderate or low; unconsciousness may develop rapidly and early, or slowly and late, and

such symptoms and signs as headache, rigidity of the neck, Kernig's sign, knee-jerks, localizing neurological signs, convulsions, vomiting, leukocytosis, may all be either present or absent.

TABLE I.

SYMPTOMS.	NUMBER OF CASES.	SYMPTOMS.	NUMBER OF CASES.
Onset	{ Sudden 9 Medium 13 Gradual 37	Convulsions	{ Early .. 8 Developed 12 Absent 40
Temperature	{ High 11 Moderate 18 Low 19	Vomiting	{ Present 41 Absent 19
Unconsciousness ..	{ Early 2 Medium 15 Late 41	Pulse	{ Slow 15 Rapid 43
Headache	{ Present 17 Absent 42	Cheyne-Stokes Breathing.	{ Present 18 Absent 42
Rigid Neck.....	{ Early 7 Developed 29 Absent 23	Leukocytes	{ Present 10 Absent 8
Kernig	{ Early 7 Developed 21 Absent 31	Tuberculin Reaction.	{ Present 8 Absent 5
Knee-Jerks.....	{ Exaggerated .. 15 Normal 20 Absent 24	Spinal Fluid.....	{ Clear 51 Slightly cloudy. 7 Cloudy 0 Bloody 2
Localizing Neurologic signs.	{ Early 2 Developed 19 Absent 39	Intradural Pressure.	{ Present 42 Absent 16
Rabinski	{ Present 19 Absent 35	Predominating Cells.	{ Mononuclear .. 60 Polynuclear .. 0
		Fibrin	{ Present 42 Absent 16
		Bacilli	{ Found 15 Not found..... 45

TOTAL DURATION.

2—4 days	3
5—7 days	4
8—14 days	15
15—21 days	15
22—28 days	11
Over 28 days	8

The characteristics of the cerebrospinal fluid are of greater value than the clinical picture in the diagnosis, but are often inconclusive as the basis of a positive diagnosis. Were it possible to demonstrate tubercle bacilli in all cases, or even in the great majority of cases, the examination of the cerebrospinal fluid would be of positive value. But the difficulty of demonstrating tubercle bacilli in the fluid obtained by lumbar puncture is so great that it has become the usual practice to depend upon other characteristics of the fluid. The clearness of the fluid is a useful means of distinguishing the tuberculous from certain other forms of menin-

gitis, although there may be slight cloudiness, but is of no value in differentiating tuberculous meningitis from other diseases. The main reliance is placed on the predominance in the fluid of the mononuclear lymphocytes, as shown by a different count of the cells in stained coverglass preparations. In the writer's analysis of 60 cases this predominance of lymphocytes was present in every case, and its absence should be regarded as precluding a diagnosis of tuberculous meningitis. Nevertheless, the writer has seen a number of cases in which such predominance of lymphocytes was present, and which were consequently diagnosed as tuberculous meningitis, but which later proved to be other diseased conditions. It has also been shown that the mononuclear lymphocyte is normally present in the cerebrospinal fluid. Reliance must consequently be placed upon a diagnostic increase in the number of lymphocytes in tuberculous meningitis. With the method usually employed in the examination of the cerebrospinal fluid, that of making coverglass preparations from the centrifugalized sediment, the lymphocytes present in normal fluid might easily, through centrifugalization, be made to appear increased in number. This probably accounts for many cases of mistaken diagnosis. Such a method of examining a centrifugalized sediment is far too inaccurate to demonstrate an increase in the number of lymphocytes. More accurate methods have been devised for demonstrating an increase in the number of lymphocytes, and a standard number of lymphocytes for normal fluid has been determined. But an increase in this number has been found in certain diseases other than tuberculous meningitis.

A third characteristic of the disease, the invariable occurrence of death, is frequently brought forward as a basis of confirming or rejecting the diagnosis of tuberculous meningitis. The outcome is most frequently used in rejecting the diagnosis in cases which, having been diagnosed as tuberculous meningitis, end in recovery. It is then argued that the diagnosis was wrong, because tuberculous meningitis is invariably fatal. No more perfect example of begging the question can possibly be imagined than such an argument, for it makes an invariably fatal outcome essential to the diagnosis of a disease, the invariable fatality of which can only be proved by the diagnosis. There is no especial reason other than experience for regarding tuberculous meningitis as always fatal. The analogy of other acute tuberculous processes.

is in favor of the possibility of recovery. There are on record many cases of recovery in which the diagnosis was supported by the clinical picture and the cytological characteristics of the cerebrospinal fluid, which, while not proven to be actual cases of tuberculous meningitis, were not proven not to be cases of this disease.

Evidence of the Possibility of Recovery.—It is seen, therefore, that the conditions surrounding the diagnosis of tuberculous meningitis are of such a character as to render the making of a positive diagnosis in this disease extremely difficult, and only to be attained in a comparatively small number of cases. It is impossible to prove that the disease is invariably fatal. It is quite conceivable that, with a very high, but not absolute, fatality, there might be no cases of recovery on record in which the proof of the correctness of the diagnosis was complete. Every case of apparent recovery in which absolute proof was lacking has been rightly rejected. The possibility of recovery is as difficult to prove as invariable fatality.

Nevertheless, some evidence of this possibility has appeared in medical literature from time to time. A few, very few, cases of recovery have been reported in which tubercle bacilli were found in the cerebrospinal fluid. If these few cases bear the same proportion to the whole number of recoveries as the number of cases in which diagnostic proof is completed bears to the whole number of cases, the possibility of recovery is sufficiently great to interest the clinician.

The Count of the Number of Lymphocytes per Cubic Millimeter in the Diagnosis of Tuberculous Meningitis.—Anything increasing the certainty of the diagnosis of tuberculous meningitis, or which increases the frequency with which a positive diagnosis can be made, will be of great future value in determining the question of the prognosis of this disease. In this connection the writer has turned his attention to the estimation of the exact amount of the increase in the number of lymphocytes seen in this disease, as compared with the number of lymphocytes seen in normal cerebrospinal fluid, and in other diseases, with a view to determining whether, in tuberculous meningitis, there is constantly a sufficient increase to constitute a diagnostic characteristic of this disease.

It is to Fuchs and Rosenthal that we owe the introduction of

the more accurate method of slide counting, which has replaced the old inaccurate method of counting the number of cells to the field in a coverglass preparation made from a centrifugalized sediment. They first employed a modification of the Thoma Zeiss blood counting apparatus, as a more accurate means of estimating the number of cells. The technique employed by the writer was that described by Waterman in a recent publication ("The Value of Lumbar Puncture in Syphilitic and Parasymphilitic Diseases of the Nervous System"). The ordinary white blood corpuscle counter was used, drawing a staining mixture up to 0.5 and filling the tube to 11 with freshly-drawn cerebrospinal fluid which had been thoroughly shaken. The ordinary blood counting slide was employed, the cells within the squares on 10 slides being counted. This gives the number of cells per cubic millimeter. The staining mixture employed was methylene violet 0.1, acetic acid 2, and water 50, which mixture seems to bring out the character of the cells. The writer found that the staining mixture was not necessary, as good results can be obtained by substituting glacial acetic acid.

To quote Waterman: "The value of this method lies chiefly in its accuracy, allowing the results of one investigator to be compared with those of another, without question of any variation depending on technique. In this way it may be possible, by collecting a large number of cases, to make fine distinctions between a number of conditions in which lymphocytosis has been found, and we do not need to deal with such terms as "positive results," "moderate increase," and "marked increase."

All the evidence goes to show that the normal fluid, by this method of counting, demonstrated from no cells to three cells in a cubic millimeter. For the purpose of comparing the counts in tuberculous meningitis with normal and other diseased conditions, the writer has taken ten cells per cubic millimeter as the possible upper limit of the normal count, regarding the normal standard as from 0 to 10.

Of course the cell count is regularly increased in the other forms of meningitis, the increase being usually enormous, far above that of tuberculous meningitis, in early cases running into the thousands, but these cases are usually easily distinguished from tuberculous meningitis by means of other characteristics of the cerebrospinal fluid, such as the predominance of polynuclear

cells and the presence of the specific microörganism involved. It has been shown also that there is nearly always a moderate or marked increase in the cell count in cases of (1) syphilis with active secondary lesions, (2) syphilis of the central nervous system, (3) syphilitic eye disturbance, (4) tabes, (5) general paresis. In addition to these an increase may be found in (1) multiple sclerosis, (2) mumps, (3) herpes zoster. Many of these conditions are rare in childhood, and none of them are conditions which are apt to be in question in considering the diagnosis of tuberculous meningitis.

The writer's records include 71 examinations, representing 60 cases, of the number of cells per cubic millimeter found in the cerebrospinal fluid of cases of tuberculous meningitis. The count was above the normal in all cases. The lowest count was 30, and the highest 920. These cell counts may be seen from the following table:—

TABLE II.

Cells per Cubic Millimeter.	Number of Counts.
0- 10	0
10- 50	5
50-100	12
100-200	25
200-400	25
over 400	4

This table shows the amount of increase above the normal usually found. From another point of view, the following table shows the percentage of cases in which the increase reached certain figures:—

TABLE III.

Cells per Cubic Millimeter.	Percentage of Cases.
Over normal	100 per cent.
“ 50	93 “ “
“ 100	76 “ “
“ 200	40 “ “
“ 300	15 “ “
“ 400	5 “ “

From these results the inference may be drawn that an increase in the number of cells per cubic millimeter found in the

cerebrospinal fluid in tuberculous meningitis is constantly present and is usually considerable. There is, indeed, quite a wide margin, of 20 cells per cubic millimeter, between the upper normal limit and the lower limit found in tuberculous meningitis. This is diagnostic in distinguishing tuberculous meningitis from patients who are not ill.

In order to determine how far an increase in the cell count is diagnostic of tuberculous meningitis, we must know whether the cell count is increased in other diseased conditions, and, if so, what is the extent of the increase.

The writer has had the opportunity to perform lumbar puncture and to estimate the cell count of the fluid in a considerable number of other diseased conditions. This opportunity occurred in connection with work with the Flexner antiserum for epidemic meningitis carried out during the last two and a half years, in the course of which lumbar puncture was performed in every case in which meningitis could not be positively excluded. The results are of particular value, as they are based on a class of cases which did, and frequently do, bear a notable clinical resemblance to the various forms of meningitis. The results of this investigation may be seen in Table IV. :—

TABLE IV.

Disease.	Cases with Cell Count Normal.	Cases with Cell Count Increased.
Lobar-pneumonia	14	0
Anterior poliomyelitis	6	0
Typhoid fever	3	0
Solitary tubercle	2	0
Cerebellar tumor	2	0
Cerebral hemorrhage	2	0
Rheumatic fever	3	0
Otitis media	4	0
Measles with pneumonia	1	0
Gastroenteric intoxication	7	0
Tetanus	0	1

It appears from these results that no increase in the cell count above the normal occurred in any of the diseases most commonly mistaken for meningitis, the only case in which such increase was

found being the case of tetanus, in which the cell count was 60. This case was not mistaken for meningitis, the lumbar puncture having been performed for the purpose of injecting magnesium sulphate into the spinal canal. Therefore, although the number of cases examined is still too small to permit the drawing of positive and final conclusions, yet there seems to be weighty evidence for regarding a marked lymphocytosis as a diagnostic sign of tuberculous meningitis, provided that the cell count is estimated by an accurate method. The presence of this definite and measurable lymphocytosis, if constant, is an important addition to our means of diagnosis. It is hoped that an accurate method of estimating the lymphocytosis will be generally adopted, particularly in cases coming to autopsy, in order that the value of this sign in diagnosis may be finally determined.

The Value of an Accurate Estimation of the Lymphocytosis in the Cerebrospinal Fluid.—This procedure has already proved of great value in many doubtful cases. The writer has records of cases in which the diagnosis was extremely doubtful, but in which a cell count of several hundred gave evidence of tuberculous meningitis, and in which this diagnosis was later confirmed by autopsy. On the other hand, the accurate estimate of the cell count has proved useful in other doubtful cases, in which a normal cell count gave evidence against tuberculous meningitis, and the subsequent developments proved that this evidence was correct. The procedure has been of especial value in the differential diagnosis between tuberculous meningitis and the cases of gastroenteric disturbance and toxic absorption which frequently simulate it. In a number of the latter cases tuberculous meningitis has been early excluded by the cell count, greatly to the relief of the parents, and in every such case in the writer's series the favorable prognosis has been justified by developments. The writer recalls one case in particular, in which a consultation of Doctors Rotch and Jacobi decided that tuberculous meningitis was the most probable diagnosis, but in which the cell count was normal. The case later proved to be one of intestinal autointoxication.

There appeared to be no definite relation between the stage of the disease and the amount of the lymphocytosis. A very important fact was, however, that the lymphocytosis was found in every case, no matter how early, the series including a number of cases examined on the second or third days of illness.

With reference to the possibility of recovery from tuberculous meningitis, which was the original theme of this paper, the writer believes that if the cell count is proven to be a positive diagnostic sign there is every likelihood that the evidence in favor of such possibility will be multiplied, for if there is a possibility of recovery which has been prevented from standing out clearly by the difficulty of making a positive diagnosis, it should presently appear if the difficulty is lessened. The writer has records of 3 other cases of apparent recovery, in which a diagnosis of tuberculous meningitis was based on the clinical features, with a cerebrospinal fluid showing a high lymphocytosis as measured by the cell count, but in which tubercle bacilli were not demonstrated. These cases are not scientifically proven cases of tuberculous meningitis, and not worth reporting, unless the cell count is a positive diagnostic sign. If it is, they increase the evidence in favor of a possible favorable outcome in this fatal disease.

Early Lumbar Puncture Recommended.—In regard to the treatment of these cases, is there not a possibility that in the case reported above the very early performance of lumbar puncture might have had some favorable action? It is noteworthy that in 2 cases of recovery reported from Copenhagen, in which bacilli were found, it was stated that the treatment was by repeated lumbar puncture. In the writer's 3 unproven cases of recovery, in which the diagnosis was based on the cell count, it is noteworthy that in all three lumbar puncture was performed unusually early in the course of the disease. Most cases of tuberculous meningitis do not receive early lumbar puncture. The cases in the hospitals are usually seen late in the course of the disease. In private practice, and in many early hospital cases, the procedure of lumbar puncture is postponed until the gradual development of the disease has brought on unconsciousness. The writer is inclined to advocate, in suspected cases, early lumbar puncture, with an accurate estimation of the cell count.

Summary of Conclusions.—In view of the above case, and the few other cases of recovery reported in the literature, and of the evidence on which the prevalent idea of the fatality of the disease is based, the writer believes the conclusion is justified that it is not proven that tuberculous meningitis is invariably fatal; that there is some evidence of the possibility of recovery; and that there is a possibility that this evidence may be increased by in-

creasing the frequency of making a positive diagnosis through an accurate estimation of the cell count.

If these conclusions are justified it is of great importance to us in dealing with the parents and relatives of our patients; in the matter of prognosis, we need never give an absolutely fatal prognosis. The writer is accustomed in these cases, while not minimizing the seriousness of the condition, to give two faint rays of hope. The first is that his diagnosis is wrong, the second is that there is some evidence of the possibility of recovery.

DISCUSSION.

DR. NORTHRUP.—I think Dr. Dunn has undertaken a very large proposition. If he is willing to go on record that this method of diagnosis is accurate I have nothing to say. I have had one of these "don't know" cases myself. I should like to ask Dr. Dunn to what age he limits this diagnostic method? The case I refer to had convulsions, persisting vomiting, retraction of the head, coma, Kernig's sign, stiff neck and opisthotonus, sighing respiration, etc. Lumbar puncture gave increased fluid and increased lymphocytes, but the patient suddenly began to get better; why, we do not know, and so I call that a "don't know" case. The only exact method, of course, would be the finding of bacilli.

DR. MEARA.—I have lately correlated the cases of meningitis of the last three years in Bellevue Hospital. Of 50, in which lumbar puncture was done, in 47 the bacilli were recovered. The technical work was done by Dr. Charles Norris. The results correspond very closely with those of Dr. Dunn. There was also in some cases an increase from .02 per cent. to .09 per cent. in proteid. One child under one year, in which the bacillus had been found in the fluid, so improved after some weeks that we thought we had a case of recovery, but the child suddenly got worse and died. The blood count in this series showed decided leukocytosis, some as high as 36,000. The polymorphonuclear count greatly increased; in some as high as 90 per cent. There were a number of cases of so-called meningismus in which there was slight increase in cells. I think Dr. Dunn said the frequency with which the bacilli were found in the fluid was not so great, but I think our methods were accurate.

DR. HAMILL.—I have not formally reported, but in discussion I have referred to the recovery of a case of tuberculous meningitis confirmed by the demonstration of tubercle bacilli in the cerebrospinal fluid, which was under my care a few years ago. I never laid much stress upon this case because no animal in-

jections were made and so the final link in the chain of evidence was lacking. I never hesitated, however, to believe that it was a case of tuberculous meningitis and that the organism found was the tubercle bacillus.

DR. GRIFFITH.—As a matter of history, I would say that Fürbringer, who was the first to bring lumbar puncture into practical prominence, reports, as I remember, the finding of the tubercle bacillus in a case which afterward recovered.

DR. CHURCHILL.—The presence of the bacillus is the only evidence that can be considered positive. The increase of lymphocytes is not sufficient, though some of these cases which show lymphocytosis may be cases of meningitis.

DR. ABT.—I believe cases of tuberculous meningitis may recover. I remember as a student in Vienna Professor Goliski used to show the brain of a child in which the diagnosis had been made and in which the child recovered and the diagnosis was supposed to be doubtful. The child finally died of some other disease, and the old scars of the base of the brain were evident, and no doubt was left as to the question of its being a case of tubercular meningitis.

DR. DUNN.—I might say that in a part of the paper which I omitted reading I called attention to the diseases in which there is an increase of the lymphocytes, which included syphilis. The main point I wished to make was that the regular methods of demonstrating an increased number of leukocytes has been too inaccurate. I do not think the method of slide counting has been widely enough employed. A standard for normal fluids has been established. Waterman did a lot of work in that line. An increase of the lymphocytes has only been found in the diseases I mentioned in my paper. In none of my cases was there a count above 10 in meningismus.

Dr. Flexner said this morning that an increase of lymphocytes is present in early stages of poliomyelitis. As to the bearing of the number of leukocytes on the possibility of recovery, it may not increase the positive evidence, but it may be of great help if it proved that the increase in the number of lymphocytes will give us a diagnostic standard.

DR. ADAMS.—The writer made the statement that we should not be without hope in these cases; that we should advise parents to have a good deal of hope. That being the case, and granting that the diagnosis has been proven, upon what does he base his prognosis of probable cure?

DR. DUNN.—I do not like ever to give an unfavorable prognosis. I tell them that there are two possibilities of hope—one that the diagnosis may be wrong, and again that some cases, although very few, may recover.

EDITORIAL.

THE USE OF HUMAN BLOOD SERUM IN HEMOPHILIA.

With the newer and more perfect technique for the direct transfusion of blood from one human being to another, the resurrecting of which we owe to Crile, the procedure has been used with a view of curing bleeding in the newly born, and with considerable, often brilliant, success. However, fatalities have occurred, and the procedure cannot be accepted as entirely free from danger. Similarly the injection of a foreign serum for a like purpose of checking hemorrhage, while often successful, yet carries with it the possibilities of serum sickness and anaphylaxis.

Welch* regards the intravascular destruction of transfused blood corpuscles, and the occurrence in the marrow of leukocytes engulfing one to several red blood cells as evidence that the transfused corpuscles are foreign material merely, and not essential to the success of the transfusion, while they may be the cause of such accidents as occur by embolism or thrombosis. He therefore has investigated the value of the injection of normal human serum, in cases of hemophilia neonatorum, with results which promise much.

He reports 8 cases, only 1 of which died, and in this case the death was due to persistent atelectasis forty-nine days after all bleeding had ceased, and at autopsy none of the tissues showed signs of bleeding. The hemorrhage ceased usually after two or three days of injections, in several cases immediately upon beginning the injection treatment. The amount injected varied from 6 c.c. to 10 c.c. to a dose, and from 10 c.c. to 65 c.c. per diem. The temperature, which was elevated during the continuance of the bleeding, subsided quite promptly after beginning the serum injections, and the loss in body weight, which was, of course, rapid during the bleeding, was promptly checked. In 3 cases a prompt gain in weight took place.

The apparatus which Welch uses consists of an Erhlenmeyer flask, stoppered with a rubber stopper, through which pass two

* Welch, J. E., "Normal Human Serum as a Curative Agent in Hemophilia Neonatorum: A Preliminary Report with Suggestions for Its Use in Other Conditions." *American Journal of Medical Sciences*, June, 1910.

tubes—(1) a straight tube drawn to a fine point and filled with cotton and equipped with a rubber tube, such as is used for drawing blood up into a hematocytometer pipette; (2) a U-shaped tube, fitted with a needle, which is cotton plugged into a small sterile test-tube. When the needle is plunged into an arm vein, the blood may be drawn into the flask by suction and allowed to coagulate. When the serum has separated it may be used.

Welch is convinced that the injection of normal human serum never gives serum sickness nor causes anaphylaxis, and further believes that it is actively bactericidal, and cites its use in a case of streptococcemia, where the injection of 50 c.c. of serum apparently brought about a subsidence of the temperature and a clearing of all bacteria from the blood.

One phase of the employment of normal human serum which Welch alludes to, and which a survey of his cases suggests, should attract the attention of the pediatricist. It is the rapid gain in weight of some of the cases and the fact that the serum is physiologically a perfect food. So many children die during acute illness, because, with the affection of lung or ear or meninges, the digestion is depressed, and even the weakest food cannot be converted into substances which can be utilized by the body tissues. Notorious is the falling away of children subsequent to the intestinal affections of summer, when the stools have cleared, the temperature subsided, and the toxemia disappeared. Then slowly they emaciate, and, suddenly, they are gone. There surely is a field among these cases for the use of this serum.

TREATMENT OF INCONTINENCE OF URINE.—M. Jeanbrau (*La Clin. Infant.*, January 15, 1910, No. 2, p. 63) brought before the Soc. des Sciences Méd. 3 cases of nocturnal incontinence of urine cured by acidification of the urine. He had noticed that in these cases the urine was either neutral or alkaline; he prescribed phosphoric acid and the incontinence immediately disappeared. The author is of opinion that adenoids and adherent prepuce play subsidiary parts. He administers the phosphoric acid as Bardet's lemonade. Acid phosphoric, official, 28 grains; tincture of orange, 20 grains; syrup, 250 grains; distilled water to 1 liter. One to two glasses daily for an adult, one to two small glasses for a child.—*British Journal of Children's Diseases*.

EDITORIAL NOTE.

In view of the great importance of this subject to pediatricists, the Editors heartily endorse the recommendation of the following letter:—

August 11, 1910.

To the Editor of ARCHIVES OF PEDIATRICS.

At the recent meeting of the Congress of American Physicians and Surgeons held in Washington in May, 1910, a joint session of the American Orthopedic and American Pediatric Societies was held and the subject of epidemic poliomyelitis was discussed. The following resolution was adopted:—

“It having been shown by recent epidemics and investigations connected with the same that epidemic infantile spinal paralysis is an infectious communicable disease that has a mortality of from 5 to 20 per cent., and that 75 per cent. or more of the patients surviving are permanently crippled, state boards of health and other health authorities are urged to adopt the same or similar measures as are already adopted and enforced in Massachusetts for ascertaining the modes of origin and manner of distribution of the disease, with a view of controlling and limiting the spread of so serious an affection.”

A committee, with Dr. Robert W. Lovett, President, Boston, Mass., Dr. Irving M. Snow, Secretary, Buffalo, N. Y., was appointed to urge the various state and municipal health authorities to take up the work of investigation of the various foci of epidemic poliomyelitis, to study its epidemiology and to instruct the public that the disease is at least mildly communicable.

May we ask you to publish this letter and the resolutions in your journal, and also to allude to the matter editorially, urging the health commissioners of the various states of the United States and of the provinces of Canada to follow the example of the Massachusetts health department in studying the epidemiology of poliomyelitis.

Respectfully yours,

ROBERT W. LOVETT, M.D., *President,*
Committee on Poliomyelitis, American
Orthopedic and Pediatric Societies.

IRVING M. SNOW, M.D., *Secretary,*
476 Franklin Street, Buffalo, N. Y.

MISCELLANY.

THIRD INTERNATIONAL CONGRESS OF SCHOOL HYGIENE.

REPORT OF PROCEEDINGS KINDLY PREPARED BY OUR COLLABORATOR,
DR. JOAQUIN L. DUEÑAS, DELEGATE FROM CUBA.

This Congress, so enthusiastically initiated by the physicians of Nuremburg in 1904, met again in London in 1907, and has just obtained in Paris, as reasonably anticipated, an extraordinary success. Physicians, psychologists, physiologists, hygienists and educators of all countries have here reported the result of their labors during the last three years. An excellent Exposition of School Hygiene, located in the Grand Palais des Champs-Élysées, has shown the progress made up to the present moment in this new branch of scientific activity, pointing out the necessary reforms for the improvement of the school systems and organizations in all countries.

The inauguration of the Congress took place on the 2d of August, within the great amphitheatre of the Sorbonne, and was presided over by Professor Landouzy, representing the Secretary of Public Instruction. Beside M. Landouzy were seated: Dr. Alberto Mathieu, President of the Congress; M. Bellan, President of the Municipal Council; Germany's delegate, that of England, and a few other members of the Organization Committee, amongst them M. Dufestel, the active Secretary of the Congress. In the foreground were the official delegates of all nations, and more than 1,500 members of the Congress occupied the huge amphitheatre.

Dr. Landouzy opened the session with a fine speech of welcome in the name of France to the members of the Congress, thereafter referring with deep insight to the object of the Congress, the actual importance of school hygiene, its wide scope, the duties of a physician, and the collaboration he should give to the teacher and the family to the end of transforming this multitude of school children, who hold an intermediate position between normality and abnormality and who require greater care in their

physical, moral and intellectual direction. The orator entered into other very appropriate scientific considerations, finally alluding to the transcendental problem of hygienic education, which, starting from early childhood, safeguards the moral and physical well-being of the individual and the species. Repeating the words of Descartes, he closed his eloquent speech, stating that should there exist any way of making men more sage and skillful than what they have been heretofore, it surely should be looked for within the practice of medicine.

Dr. Mathieu gave a résumé of the object and end to be had in view by the assembly meeting there, the progress made up to now and the reforms which would soon be put into effect in the methodical organization of the school hygienic service of France.

He was followed by M. Bellan, who spoke in the name of the City of Paris, and was followed by the General Secretary of the Congress, Dr. Dufestel, and finally by the delegates of foreign governments in alphabetical order.

On the following day commenced the sessions of the Congress, in the upper floor of the Grand Palais des Champs-Élysées, said sessions being divided into general and special ones, the latter, consisting of eleven sections, working independently in each one of the different departments of the building.

At ten o'clock in the morning the opening of the Exposition of School Hygiene, located in the lower floor of the Grand Palais, took place. The ceremony was presided over by M. Gervais, Director of the Cabinet of Public Instruction, who was received by M. Mathieu, M. Bedorez, Director of Primary Instruction, and M. Friedel, Secretary of the Exposition, a visit being thereafter made to the various installations.

GENERAL SESSIONS.

First Session.—August 3d.

UNIFORMITY OF METHOD FOR PHYSICAL EXAMINATIONS IN SCHOOLS.

PRESIDENT: M. LE DR. GILBERT, Professor of the Faculty of Medicine of Paris.

REPORTERS: France, M. M. Mery and Dufestel; England, M. I. Kerr.

DR. KERR believes that medical inspection should have a practical aspect as well as a scientific one, it being convenient to group but a few facts, well defined and classified.

A preparatory selection of healthy children is imperative in order to thereafter carry out an observation of abnormal children, generally irrespective of weight and other measurements, as well as of all minute details as to personal and family records, all of which gives rise to a great loss of time and money.

DRS. MERY AND DUFESTEL confined themselves to a reference on the technique of physical examination of children—weight, height, perimeter of the thorax in inhalation and in expiration, the one at the level of the xipho-sternal junction and the other at the level of the axillary cavity. The examination of the organs should successively include the various regions of the thorax, the eyesight, the audition, the frame, the scalp and the nervous system.

The discussion of this important matter on methods of examination in order to provide documents available for comparison did not assume a concrete phase, it being decided that the Association of Medical School Inspectors of the City of Paris should appoint a committee charged with a careful study of the subject.

Second Session.—August 4th.

SEXUAL EDUCATION.

PRESIDENT: M. LE DR. LANSON, Professor of the Faculty of Letters of Paris.

REPORTERS: France, Dr. Doleris; Germany, Dr. Chotzon (Breslau).

The discussion of such a delicate and interesting theme attracted a great attendance to the hall.

M. LANSON made a vigorous speech, manifesting his surprise upon his presiding a session really within the realm of medicine. "But," he added, "should there be any question coming up before this Congress in the shape of a binding tie between the physician and the pedagogue, it surely is that of sexual education."

DR. CHOTZEN regrets that education institutes should daily apply themselves more and more to instruction, to the neglect of

education. He believes that sexual education should be directed both within the home and the school, although in a different manner. In school it should be attended to by a physician. When teachers shall have acquired the proper knowledge, they will then be able to take the matter in hand.

DR. DOLERIS.—Within the home the mother should instruct the daughter, the father the son; but many refuse, and the majority prefer to leave the matter in abeyance and its solution to the natural course of events.

What a father should be asked is not to tell his children untruths, to respect their natural eagerness for instruction and reply to their questions with clearness and discretion, according to their age and intelligence. Children should be left to observe the examples which nature places before them, it being sufficient to hide from them the grosser side of things.

Only science should be charged with the logical and systematic instruction, which alone is capable of preparing childhood to conform to the rules of a healthy biology without straying from the requirements of necessary morality.

This programme still remains unfinished. Sexual pedagogy does not exist in France. This system of education will have to vary according to the child's temperament, and Dr. Doleris, after making an admirable study of the subject, proposes an excellent organization for sexual instruction through teachers. Dr. Doleris' work, by reason of its extensiveness, its lofty philosophy, its radical spirit and the ingenuity of its conception, is colossal.

A hundred members of the Congress prepared themselves to speak, when it was announced that the debate would have to be adjourned to the next session, due to the lateness of the hour.

Third Session.—August 5th.

PREPARATION AND SELECTION OF THE SCHOOL PHYSICIAN.

PRESIDENT: M. LE DR. CHANTEMESSE, Professor of the Faculty of Medicine of Paris.

REPORTERS: France, Dr. Lesieur; Belgium, Dr. Desguin.

M. LESIEUR.—The school physician should have a good knowledge of general medicine and should, in addition, familiarize himself with child treatment. He should likewise ac-

quire the most useful notions of ophthalmology, rhinology, etc. He should also be a physician hygienist, with certain familiarity in matters of sociology, pedagogy and be able himself to teach and speak easily on these subjects. For all this there should be special preparatory courses in medical universities. It is important that school doctors should be well selected and remunerated, as they are entrusted with the health of children, the future and well-being of nation and race.

M. DESGUIN.—It is necessary that the school physician be not a specialist, but a general physician with special knowledge. He should also unite great intellectual culture to the most solid professional instruction. He should likewise have the qualities of a man of the world. There is not, therefore, any special preparation to be exacted from school physicians. The general qualities enumerated above, and that they be capable of assimilating by observation and experience the knowledge inherent to the faithful fulfilment of their duties, should suffice.

The sagacity required to make a choice selection of such physicians should appertain to the administration.

Drs. Hogarth, Queiton (Belgium), Mackevitch (Servia), Valloton (Provenza), Mathieu (Paris) participated in the discussion of this report, and the President made a condensation of them all, showing they were all of the same view in that the school physician should be competent and conscientious.

REGULAR SESSIONS

With the object of facilitating the work, the Congress subdivided itself into eleven Sections, the official themes previously published, as well as the communications thereupon sent by the members of the Congress, being read to each Section.

All of the Sections were well attended and the majority of the discussions were interesting.

The Sections were as follows:—

SECTION I.

School Buildings and Furniture.

PRESIDENT: M. COURMONT, Professor of Hygiene of the Faculty of Medicine of Lyon.

SECTION II.

Hygiene of Residential Schools.

PRESIDENT: M. GAUTIER, former High-school Director of Paris.

SECTION III.

*Medical Inspection of Schools and Individual Health Records.
Practical Measures for Actual Application.*

PRESIDENT: M. LEGENDRE, Hospital Physician of Paris.

SECTION IV.

Education and Physical Training.

PRESIDENT: M. CAZALET, President of the Union of Gymnastic Associations in France.

SECTION V.

Prophylaxis of Diseases in School.

PRESIDENT: M. HUTINEL, Professor of Children's Clinic, Faculty of Medicine, Paris.

SECTION VI.

Out-of-school Hygiene. Open-air Schools. Vacation Colonies.

PRESIDENT: M. PETIT, General Inspector of Primary Instruction.

SECTION VII.

The Teaching Staff: Their Hygiene, their Relations with the Homes and with the School Doctor.

PRESIDENT: M. LYON, Rector of the University of Lille, France.

SECTION VIII.

Teaching of Hygiene to Teachers, Scholars and Parents.

PRESIDENT: M. PINARD, Professor of the Faculty of Medicine, Paris.

SECTION IX.

Teaching Methods and Syllabuses in Relation to School Hygiene.

PRESIDENT: M. LANSON, Professor of the Faculty of Letters, Paris.

SECTION X.

Special Schools for Abnormal Children.

PRESIDENT: M. GASQUET, Director of Primary Instruction in the Department of Public Instruction.

SECTION XI.

Sub-division I. Hygiene of the Eye.

PRESIDENT: M. TRUC, Professor of Clinic Ophthalmology of the Medical Faculty of Montpellier, France.

Sub-division II. Hygiene of Ear.

PRESIDENT: M. MOURE, Clinic Professor in Throat, Ear and Nose Diseases of the Bourdeaux Medical Faculty of France.

Sub-division III. Hygiene of Mouth and Teeth.

PRESIDENT: M. CRUET, Hospital Dentist of Paris.

CLOSING SESSION.

The above session took place, with the greatest solemnity, at nine o'clock on the morning of the 6th in the great amphitheatre of the Sorbonne. The session was presided over by Mr. Henry Cheron, Sub-Secretary of the Navy; the President of the Congress, M. Mathieu, and Messrs. Gautier, Petit, Brunton, Griesbach, etc., etc., being seated beside him.

The speech of the Secretary of the Navy was an excellent one. He is a man of culture, who takes particular pleasure in the study of hygiene, and was therefore enabled to carefully follow the work of the Congress, fulfilling his allotted task in the most proper and captivating manner, which frequently drew prolonged applause from his hearers.

He spoke on the importance of the work presented in this Congress; the necessity of watching the hygiene of children from

the moment they enter the school; he pointed out the responsibility incurred by municipalities when they permit—led by false ideas of economy—work to be done in unhealthy and inadequate surroundings, thus jeopardizing the health and life of children.

Such a Congress as this, he added, tends to educate opinion as well as those representing such opinion. It is impossible that such substantial work should not produce fruitful results. The organization of the medical inspection service is the origin of all progress in school hygiene and the draft of law now being prepared by the Department of Public Instruction will be voted law without delay under the influence of this idea. The same should be said of a great number of supplementary additions which should surround a school in the interest of child hygiene. The organization of the fight against intemperance will likewise emanate from the holding of this Congress; and future generations should be taught to hold alcohol in horror, as the cause of misery, crime and death. The work of a systematic education drawing away from intemperance should be added to such restrictions as the laws may devise.

It is insufficient, said the orator, in concluding, to place on the foreheads of children laurels symbolic of their purity of heart; it is necessary to develop their strength, lead them away from unhealthy associations, render them every day fitter in mind and body, thus simultaneously increasing their individual worthiness and the nation's patrimony, as they constitute its pride and future hope.

Dr. Mathieu also thanked the members of Congress for the efficiency displayed in their work, and forthwith read the resolutions proposed by the Permanent Commission of Congresses on School Hygiene, which were unanimously approved by the General Assembly.

I. That hygiene should be taught in special courses in all schools for teachers. That such instruction be given by physicians and sanctioned by examinations.

II. That the Association of Medical Inspectors of the City of Paris should appoint a committee charged with the study and codification of such instruction as should be especially given school physicians, insisting on the advisability of rendering such rules simple, precise and easy to follow.

III. That individual sanitary or health records of an uniform

character be instituted in all schools, more simple health certificates for day pupils and detailed record books for residential pupils.

IV. That physical instruction should be compulsory in all educational institutions (for girls and boys) and uniform in character. That all city councils devote playing grounds for children.

V. That preparatory sexual instruction be given children in natural history classes and a complete instruction be given to adolescents.

That candidates for teachers should be instructed by school physicians and by pedagogy professors on all the details of the sexual question.

That the necessary instruction to the children's parents be given by competent teachers or school physicians in the shape of pedagogy conferences.

Dr. Lauder Brunton spoke in the name of all foreign members of the Congress to the end of thanking the parties organizing the Congress for the glad welcome given them in France.

The delegate of the City of Buffalo invited the Congress to celebrate in that City (United States) its next meeting in 1913. This invitation was enthusiastically accepted, it being decided that the permanent Commission should organize such meeting. The speech then made by the American delegate, thanking the members of the Congress for their spontaneous acceptance, was highly eloquent and brilliant. He gave a brief outline of the topographic location of the great American city, its picturesque surroundings, its historical and commercial importance, its scientific progress, its general development, its culture, and explained the attention there given to the matter of school hygiene. He terminated taking farewell in terms of affectionate companionship, making the appointment to renew our exchange of impressions in America in 1913.

With an enthusiastic hurrah by the Sub-Secretary of the Navy ended this Congress, bound to eternally survive in the minds of its members, not only on account of the efficiency of the work done, but also because of the stimulating similarity of purpose evidenced by each separate individual toward benefiting child hygiene and humanity's cause.

VACUUM BOTTLE FOR PASTEURIZATION.

BY A. W. MYERS, M.D.,

Milwaukee, Wis.

An easy and convenient method for pasteurization was recently suggested to me by some patients who were obliged to travel with a young child in a region of uncertain milk. It consists of the use of one of the vacuum bottles, now so widely advertised for maintaining the temperature of the milk for the required period. Of course a thermometer is necessary to determine when the proper temperature has been reached in the preliminary heating of the milk, but no other apparatus is required. Milk heated to 145°F. will be found to lose only 1° degree when poured into one of these bottles, even if the bottle has not been previously heated, and at the end of thirty minutes it will be found to have lost but 1° in addition, falling only to 143°F.

As these bottles are now made so that they may be taken apart and thoroughly cleaned or sterilized, no objection can be urged to the method on the ground of uncleanness.

When pasteurization is necessary in summer hotels or in camps, or on trains or boats, this method of procedure may be found very convenient. As I have not happened to see it described, it seemed worth while to make brief mention of it.

LUMBAR PUNCTURE IN WHOOPING-COUGH.—Eckert (*Medical Press*, November 10, 1909) advocates lumbar puncture in pertussis. In postmortems on children who have died after treatment with bromid and chloral the only lesion found in the body was edema of the brain and meninges. Eckert consequently has treated several cases by lumbar puncture, followed immediately by a bath, with striking success. A speedy recovery occurs even in patients who are in an eclamptic state and have been admitted as dead. He contends that the bath after the operation is an important adjunct, as it stimulates the respiration, increases the venous flow, and at once removes the edema, the immediate cause of the disease.—*British Journal of Children's Diseases*.

CURRENT LITERATURE.

ABSTRACTS IN THIS NUMBER BY

DR. S. FELDSTEIN.

DR. M. C. PEASE, JR.

DR. L. E. LA FÉTRA.

DR. FRITZ B. TALBOT.

DR. S. W. THURBER.

DISEASES OF EAR, NOSE AND THROAT.

GRAY, A. L.: REMARKS ON THE X-RAY TECHNIQUE IN THE TREATMENT OF LARYNGEAL PAPILLOMATA IN CHILDREN. (*Annals of Otology, Rhinology and Laryngology*, June, 1910, p. 348.)

The author presents two instances in which the X-ray caused marked improvement where other measures had failed.

CASE I. Girl three and three-quarter years old. Hoarseness began three months after birth, and on July 11, 1906, tracheotomy was found necessary. The following winter she showed signs of obstruction despite the fact that she was still wearing the tube. X-ray treatment was then begun, the rays being directed to the lateral aspects of the laryngeal region through a lead protected tube, placed 10 inches from the neck for ten minutes. Thirteen treatments were given in twenty-five days. In June, 1907, she returned very much improved, and nine treatments were given in nine days. During November she received eleven treatments in nineteen days, and all traces of the growth had disappeared. The tracheotomy tube was removed permanently in July, 1908, and she had a good voice, although the wound had not entirely closed in the neck.

CASE II. Boy of six years. Had been wearing a tracheotomy tube for two years. Treatments with X-ray begun in July, 1908. Eight exposures in eight days and improvement began after the fifth. In January, 1909, he could breathe with the tracheotomy wound closed with the finger.

S. W. THURBER.

PATHOLOGY.

COOLIDGE, JR., A.: ETIOLOGY OF COMMON COLDS. (*Boston Medical and Surgical Journal*, July 14, 1910, p. 58.)

Coolidge recognizes two definite types—one infectious and the other coryza, due to vasomotor disturbances akin to hay fever. He emphasizes the fact that a "real cold" is a contagious disease. He thinks that the community will gain much by this assumption. "The objection to drafts and wet and cold in moderation,

which induces humanity to shut itself into air-tight inclosures,' is often due to an unwarrantable fear of 'catching' just those diseases which are, in fact, communicated by sneezing, coughing and poor ventilation." No specific organism has been found to explain the cause of the most common form of acute cold. The mucopurulent secretions contain different microorganisms.

FRITZ B. TALBOT.

SURGERY.

WOOD, I.: APPENDICITIS IN CHILDREN. (*Canada Lancet*, July, 1910, p. 813.)

Wood concludes: (1) That the occurrence of appendicitis in children is much more frequent than it is generally supposed to be. Selter found that appendicitis was seven times more frequent before the ages of fifteen than it was from fifteen to thirty.

(2) A large percentage of cases that occur are not diagnosed.

(3) A large percentage of cases are diagnosed too late for successful treatment.

(4) That the current literature of appendicitis should be revised, and those features of the disease peculiar to children should be clearly set forth and strongly emphasized.

(5) Our "diagnostic senses" should be awakened and trained to recognize the earliest, the initial symptoms of the disease.

(6) Physicians and surgeons should be made to realize that an early diagnosis is imperative in the case of children.

(7) That diagnosis should be followed immediately by operation.

FRITZ B. TALBOT.

BENNETT, SIR WILLIAM: SOME POINTS RELATING TO TUBERCULOUS GLANDS, MAINLY WITH REFERENCE TO TREATMENT. (*The Practitioner*, June, 1910, p. 741.)

A series of cases of tuberculous disease of the lymphatic glands treated by Sir William Bennett has impressed him with the tendency in medicine and surgery for new and even somewhat speculative treatments to displace for a time older and well-tried methods, and for the older methods to recover, partially, at least, from the temporary loss of their repute.

The article is limited to consideration of tuberculous lymph nodes in the neck, their commonest location. The first point insisted upon is that *primary tuberculous disease of the glands is*

rare. The primary lesion is almost, without exception, an infective or traumatic adenitis, the tuberculous disease following upon the lowered resistance in the gland.

The various stages in the life of a lymph node that has become tuberculous are (1) traumatic or infective adenitis; (2) invasion by tubercle bacilli; (3) resolution, caseation or suppuration; (4) suppuration after caseation. For the attempt at cure the method of treatment in any one of these stages must be different, as it is clear that the conditions differ so much that the same treatment could not be effective in all.

The tendency to suppuration will depend mainly on two factors: (1) the type of the primary adenitis—whether due to a pyogenic microbe or to causes unattended with conditions tending to suppuration; and (2) the constitutional peculiarities of the patient and his environment with regard to hygiene and food. The constitutional peculiarity in relation to suppuration must hark back, in the writer's opinion, to the old division of scrofulous patients into the "fine scrofulous type" and the "coarse scrofulous type." Patients with a pink and white complexion, delicate skin and fine hair growing rather profusely over the upper spinal region, and who are bright and energetic, belong to the "fine scrofulous type," and are far more prone to have suppuration supervene. Moreover, the destruction of tissue is greater in this type than in the "coarse scrofulous type," who are characterized by rather thick, coarse skin, a dark and muddy complexion, black, usually coarse, hair and a dull mental habit. In this type caseation without suppuration is much more common, and if abscess occurs it is much more apt to recover spontaneously. Clinically, the distinction of these two types is important as regards prognosis and treatment.

A lymph node which has become caseated usually shrinks to an unnoticeable size, and, remaining unchanged, may cause no trouble of any kind. Injury or any septic infection of adjacent lymphoid tissue may cause suppuration. There is always danger in the presence of a caseated lymph node, inasmuch as it may, by merely acting as a foreign body, lower the local resistance by its irritation, and so favor bacillary invasion. On account of their hardness and chronicity, such nodes are readily detected by expert X-ray investigation. A hard nodule apparently glandular under the body of the lower jaw may prove, however, to be a sub-maxillary calculus, as happened in one of the author's cases.

Clinically, it is important to bear in mind that a gland which is sometimes large, sometimes small, never remaining long of the same size, is a dangerous gland, and is often distinct evidence that the original source of infection is still present and requires urgent measures for its cure. This variability in size is usually a sign of either a gross deposit of tubercle or of a focus of supuration in the centre of the gland. Sooner or later such a lymph node almost always bursts its capsule and its broken down contents invade the surrounding lymphoid tissues; occasionally, however, when the lesion is a deposit of tubercle, caseation may ensue and the node become stationary in size.

An enlarged gland or cluster of glands, so long as the disease is confined within the gland capsule, retains the oval glandular shape, no matter whether it be large or small. The swelling is distinctly defined and has rounded margins. It is important to keep this in mind, since it at times happens that medical men as well as laymen are led to think, because the rounded prominence of the gland concerned disappears, that the gland itself is decreasing and the disease subsiding, whereas the apparent diminution in size is merely due to the escape of its broken-down contents into the parts around, the loss of prominence not being due to subsidence of disease in the gland, but to the escape of the diseased contents through the capsule of the gland. In chronic cases this diffuse-rounded swelling may be the first indication of serious glandular trouble, the diseased gland itself lying deep down beneath the fascia.

Treatment during the primary adenitis should look first toward discovering the focus of infection, which can generally be inferred roughly from the situation of the affected gland, together with a knowledge of the course of the lymphatic channels of the region. For example, a superficial adenitis could be caused only by infection from sources drained by superficial lymphatics, while an adenitis deep down behind the angle of the jaw must have its focus in deeper parts, such as the nasopharynx, larynx or tonsils. The infective focus may be easily discerned—as an ulcer on the tonsil, or it may be concealed. The primary indication is to heal the local infection. If no focus of infection can be found, and the affected gland persists in the rising and falling habit, or continues to increase, or even if it does not diminish, it should be removed in order to prevent further infection of adjacent glands.

Treatment During the Period of Bacillary Invasion.—If an affected gland does not diminish after the cure of the primary focus of invasion, there is great probability that it has been invaded by the tubercle bacillus; this suspicion may be confirmed by the opsonic index or other tests. In the experience of the author the good effected by the tuberculin method of treatment is confined to cases in the very early stages of bacillary invasion. After gross deposits have formed, the results of tuberculin treatment are no better than the older plan—by fresh air and good food. In fact, much of the credit sometimes ascribed to the tuberculin treatment, especially in hospital work, is due rather to the better hygienic conditions and to abundant good food with which the patient is provided.

In order to tell how far the disease has advanced, recourse should be had to the X-ray examination, which will reveal a shadow if there is tuberculous deposit, particularly caseation, in the glands. Such cases are unlikely to be amenable to the tuberculin treatment.

The open-air treatment in glandular tuberculosis gives, as is well known, remarkable benefit. As to the climatic treatment, the author is not in favor of high altitudes, but prefers either a six months' voyage or else continued residence at the seaside. But with regard to the effect of sea air, it is interesting that children, born and living at the seaside, who develop tuberculosis there are benefited by a change inland, in the same way that those who develop it inland derive benefit from a change to the seaside or shipboard.

As a rule, the less a tuberculosis gland is worried by local applications the better. Iodin vasogen is recommended above other applications. Internally, arsenic and iron are his main reliance, the arsenic being used especially with the pale, delicate type of patient.

Treatment During the Stages of Softening and Suppuration.—When the stage of softening or suppuration has been reached one must deal directly with the affected gland. "Whenever a gland, after having been for a time hard, becomes soft to the touch the sooner it is removed the better for all concerned." In operating the main object is to remove the gland, especially if deep, before the broken-down contents escape from the capsule and make their way through the deep fascia. In the case of superficial glands the object is to extirpate them before the skin is inflamed. This

not only lessens to the minimum the amount of scarring, but removes them while the disease is confined within the capsule, and so prevents extension to adjacent or distant parts. The wound may safely be sutured without drainage.

When the gland has broken down and its contents have invaded the surrounding parts, the disease should be as thoroughly cleared out by scraping as possible and a drainage tube inserted for twenty-four or forty-eight hours.

In all cases a point should be made of carefully searching for the small opening in the deep fascia, which, when found, leads directly to the centre of the diseased gland.

Treatment after caseation and calcification is not necessary unless the gland, rendered inert by the calcification, becomes injured or infected. Pain and tenderness may then supervene, and in delicate patients suppuration may then occur around the calcified mass, which acts as a foreign body. Removal of the mass is then necessary.

L. E. LAFÉTRA.

MEDICINE.

POTTER, P. S.: BILIOUS ATTACKS IN CHILDREN. (*Boston Medical and Surgical Journal*, July 14, 1910, p. 55.)

Potter considers under this heading children with attacks of fever, vomiting, headache, constipation and perhaps some abdominal pain. He considers the diagnosis and rules out appendicitis, recurrent vomiting, recurrent pyrexia, according to Still (meningitis, migraine, renal vomiting, otitis media, gastric indigestion, intestinal toxemia).

FRITZ B. TALBOT.

MANNING, JACOLYN: REPORT OF EPIDEMIC OF ACUTE ANTERIOR POLIOMYELITIS IN WISCONSIN. (*The Woman's Medical Journal*, June, 1910, p. 118.)

The author makes a report on 408 cases of anterior poliomyelitis occurring in Wisconsin in the summer of 1908. In all probability there were many more cases which were not reported, the total perhaps being as high as 1,000 cases. There are no new facts presented in the paper, but a very good summary of the spread of the disease and of the symptoms. From a statistical standpoint the article has a very real value.

M. C. PEASE, JR.

THERAPEUTICS.

STONE, A. K.: TUBERCULOUS PERITONITIS: AN APPEAL FOR TREATMENT OF PERITONEAL TUBERCULOSIS BY HYGIENIC RATHER THAN SURGICAL MEASURES. (*Boston Medical and Surgical Journal*, June 16, 1910, p. 813.)

Stone believes that in a great many cases operation does not help tuberculous peritonitis and that medical treatment should be given a more thorough trial than at present. There is no reason, however, why a patient should be withheld from any legitimate operation which may come up in the course of the disease. He believes that the disease being tuberculous the prognosis is favorable in the simple, uncomplicated cases of serous involvement. When the lungs or other distant organ are also involved the favorable prognosis rapidly diminishes. FRITZ B. TALBOT.

INFANT FEEDING.

HELBICH, H.: THE IMPORTANCE OF THE REDUCTION OF WHEY IN THE FEEDING OF YOUNG INFANTS. (*Jahrb. für Kinderhk.*, June 10th, p. 655.)

To demonstrate the effects of addition of whey the author made a series of feeding experiments on young infants. The infants were first fed on a mixture containing all the fat of the milk, two-fifths of the proteid and whey, and 5 per cent. lactose. On this mixture all the infants showed normal growth. When, instead of this, a mixture containing all the whey was substituted, some of the infants developed intertrigo during the continuance of this new food, while others, usually the young infants, began to lose weight, had rise of temperature, vomiting and diarrhea. One infant developed laryngismus stridulus. All of these symptoms disappeared when the whey was reduced, although the quantity and caloric value of the food remained unchanged. A second series of experiments, in which the percentage of casein was that of milk, but the whey alone reduced in the initial mixture and full milk given as the experimental mixture, similar effects were observed as with the other mixtures. As a result of his experience the author recommends reduction of whey in the feeding of young infants, S. FELDSTEIN,

BOOK REVIEWS.

MENTALLY DEFICIENT CHILDREN: THEIR TREATMENT AND TRAINING. By G. E. SHUTTLEWORTH, B.A., M.D., Medical Examiner of Defective Children to the Willesden Education Committee, and formerly to the School Board of London; Consulting Medical Officer, National Association for the Feeble-Minded; late Medical Superintendent (now Hon. Consulting Physician) Royal Albert Institution for the Feeble-Minded of the Northern Counties, Lancaster, etc., and W. A. POTTS, B.A., M.D., Consulting Medical Officer, National Association for the Feeble-Minded, etc. Third edition. Pp. 236. Philadelphia: P. Blakiston's Son and Co., 1910.

Dr. Shuttleworth's manual has been revised for its third edition by Dr. W. A. Potts, and brought up to date in regard both to views as to the classification of the various types of these children and to the methods of treatment and institutional facilities for treating them. There are many excellent illustrations and several helpful appendices, among them an extensive bibliography.

MEDICAL EXAMINATION OF SCHOOLS AND SCHOLARS. Edited by T. N. KELYNACK, M.D., with an Introduction by Sir LAUDER BRUNTON, Bart. Pp. 434. London: P. S. King and Son, 1910.

Although not large, this book is encyclopedic of its subject. The plan adopted of having each chapter written by someone who is particularly familiar with that phase of the subject has resulted in a list of authors of great brilliancy. An introduction by Sir Lauder Brunton initiates the thirty-two chapters, which take up first the organization of medical inspection of schools, the methods of procedure in general use in England, in particular emphasizing the conditions of different organs found as a result of routine inspection. There are chapters on School Clinics, Mentally Defective Children, Feeding of School Children and Open-Air Schools. The last fourteen chapters are devoted to a review of the work done in as many different countries. Drs. Luther Halsey Gulick, Leonard P. Ayres and R. Tait McKenzie have contributed the chapters on American work.

The book is notable for the quite extensive bibliographies appended to each chapter. It should prove invaluable for reference and suggestion to those engaged in this branch of medical work.

ITEM.

ACUTE LYMPHOCYTHEMIA IN CHILDREN.—T. R. C. Whipham (*Clin. Jour.*, December 16, 1908) reports 3 cases of this affection, which occurs chiefly in children under five years of age. Enlargement and slight tenderness of the glands are accompanied by anemia and general weakness, which rapidly become more marked. In very rare cases the glands show no evidence of being affected, but as a rule there is a general enlargement. The superficial groups, such as the cervical, axillary and inguinal, stand out as definite masses. The individual glands are firm and fairly discrete, and show no signs of caseation and suppuration. At times they are tender, and so hinder the natural movements of the body and limbs. Other groups are also affected; the bronchial, mediastinal, mesenteric, and retroperitoneal. Hemorrhages are a prominent feature; these occur in the form of a purpuric rash over the trunk and limbs, and as bleedings from the nose, gums, stomach, or intestinal tract. Hematuria is rare, but retinal hemorrhages are not uncommon. Vomiting is a frequent symptom, and diarrhea may also be present. The liver and spleen are usually enlarged to a varying degree. The temperature presents marked fluctuations, varying between 102° and 104° F. toward the end, with a corresponding increase in the pulse and respiration rates. The disease is rapidly progressive, a fatal termination occurring within three or four months, in some cases even within two or three weeks. Death may be brought about by a superadded bronchitis or pneumonia, or may be the result of increasing anemia, weakness, and coma. The erythrocytes may be reduced to about 1,000,000 per cm. Poikilocytosis and polychromatophilia are generally present, though not to a marked degree, while erythroblasts, or nucleated red cells, are to be met with in small numbers. Very rarely a megakaryoblast may be seen. The color index is usually about normal. The leukocytes may be normal in number or increased to 25,000. The lymphocytes form 90 to 99 per cent. of the total leukocytes and are usually of the small variety. The theories advanced to account for the disease are (1) that it is due to changes in the bone-marrow; (2) that it is due to some affection of the lymph nodes; (3) that it results from a bacterial infection of the blood. Nothing of real value is known as to its treatment.—*American Journal of Obstetrics*.

ARCHIVES OF PEDIATRICS

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ORIGINAL COMMUNICATIONS.

FACTORS IN THE CONSERVATION OF CHILD LIFE.*

BY HENRY L. COIT, M.D.,

Newark, N. J.

The man who is chosen by his fellows and honored in being the first to be selected for the first office within their gift is singularly favored. Much more to be coveted is such preferment among his associates than are honors conferred through activities abroad by those not of his own community or country.

We have met together to inaugurate a new departure in special medical society work, both in the objects sought and in the plans for their accomplishment. The New Jersey State Pediatric Society has imposed upon itself a great duty, and while it is in-

* Presidential address delivered at the First Annual Meeting of the New Jersey State Pediatric Society, Atlantic City, New Jersey, June 27, 1910.

cumbent upon me as its first president to be your leader, yet as individual members our duty is one and our opportunity is signally great for the fulfillment of the objects set forth in the constitution of our society, namely:

First.—To unite the physicians of the state who are engaged in the scientific study of the diseases of infancy and childhood.

Second.—To promote, by its concerted efforts, scientific medical research in the department of pediatrics.

Third.—To foster a greater interest in pediatrics by the profession at large and to spread a knowledge of pediatrics among general practitioners.

Fourth.—To study the problems of infant mortality and to popularize a knowledge of infant hygiene and of the means for the protection of child life.

In this salutatory address I shall not marshal statistics, nor record the findings of research nor draw conclusions from practical experience, but state a few important doctrines concerning the general subject of pediatrics and attempt to define some principles which, when understood and put into practice, are recognized as true factors in the conservation of child life.

That nation, community or tribe is stricken, indeed, and in a state of decadence when the children born to its people are few in number. The maintenance of a healthy national or family life depends upon a virile and normal procreateness. The lessening birth rate in some of our modern nations is a mark of retrograde civilization and a sign of the physical and moral imbecility of the people which compose them.

The gift of children is the most precious gift of God to mankind, whether it be by parental possession or by the relation which we sustain of responsibility through knowledge for their protection. Nevertheless, in almost every home the gift is needlessly sacrificed upon the altar of disease and death.

It is the natural right of every child born into the world to remain and grow to years of efficiency. It is the birthright of every human being to live to independent existence, and since the infant in its innocence and absolute dependency has violated no law of life, it should not die. If, as most men believe, its early death is largely due to ignorance, then the responsibility is ours, and it is incumbent upon us to find the means to protect it.

Infant mortality, except when due to congenital defects, is a blot upon human intelligence and a reproach to any nation. Its

chief causes seem to be connected with modern life. In the early colonial days the viability of the large families of our ancestors made most of the children progenitors of other families, and this was the bulwark of our national life; the absence of procreantness among Americans, added to the large infant mortality, is the chief menace to it to-day.

The statistics of modern infant mortality arouses our greatest apprehension. The awful picture of Rubens of the Innocents impaled upon the stillettos of the Roman soldiers amid the wail of their Judean mothers seems trivial compared with the shocking sacrifice of infant life all about us, with its loss of potential power to the nation.

The phrase infant mortality can be so often repeated that it becomes a trite saying, and when a phrase is commonplace it loses its significance. Infant mortality is the sum total in numbers of human beings under three years of age who die; but the number would be insignificant were it not for parental ignorance, preventable disease and pure neglect.

The percentage of deaths due to congenital defects, to accident, or unavoidable disease, is so small that it may be disregarded in our consideration of what infant mortality means.

Nearly one-quarter of the infants born in the centres of population perish during their first year. This is an unnecessary destruction of parental joy and a waste of human life more appalling than that entailed by war or plague or earthquake.

Almost one-third of a million young children died in our own country last year. Designed by nature to live, earnestly desired by their parents, but through high tension modern life, inimical to lactation, they became the victims of starvation, and when by necessity they passed to the alternative of artificial nourishment and depended upon the milk of lower animals for sustenance, they were subjected in thousands of cases in every large city to the vicious conditions of maternal ignorance, public indifference, death dealing fatal milk, factory foods and commercial greed.

My theme is expressed in comprehensive words by two philosophical writers. James Ward wrote: "To train up a child in the way he should grow is to so control the circumstances of his life that he shall grow as straight as possible, as much as possible, in as many directions as possible, and as harmoniously as possible."

Herbert Spencer wrote: "It is an unrecognized truth that the

ultimate stage of mental development for man and woman is reached only through a proper discharge of their parental duties."

This latter statement may well be extended to include the man or woman whose interest in child life is humanitarian, philanthropic, utilitarian, economic or purely scientific, and the consideration of any or all of these is within the scope and function of the pediatric student.

Conservation of child-life is a question of vastly more importance to the American people and vital to the integrity of the nation than the conservation of minerals, rivers or forest preserves. It is to the glory of pediatrics that many agencies for the welfare and saving of child-life are now being used for effective work. This work, through pediatric literature, is directed chiefly toward the education of physicians. Laymen are being taught how they may become philanthropists, and by the united efforts made possible by medical knowledge, aided with money, pure food and instruction in child hygiene are now carried to the homes of the poor. Thus there is a general enlightenment of parents on the value of maternal feeding, the purity of food and air and the adoption of more rational methods in the care of their children.

In dealing with modern child-life we seldom find the natural powers unimpaired, so that after we have finished our educational programme and have enforced our measures in prophylaxis; it becomes largely a question of studying closely the laws of nutrition with the processes of waste, repair and growth, and then by all the means available through accurate knowledge to conserve the vital forces and functional activities of the child in order that in the liberation of its powers and the unfolding of its life there shall be a maximum of capacity for energy that none shall be misdirected and that the surplus shall be systematically utilized in development.

With the influences resulting from the work of the professional sanitarian and the epidemiologist in their crusade against the causes of disease, together with the last agency to be realized, namely, legislation, we are slowly forging the means with which to stem the destructive tide and enable us the better to give children the power to live.

Among the factors which make for the conservation of child-life the following are of great importance, and, while they are

birthrights, not all of them are vouchsafed to the child born in these later days.

First.—Healthful and honorable parentage, in order that bodily integrity may be a firm foundation for growth, and by the legacy of a good name the battle of life may be more easily won.

Second.—The natural elementary trio of pure food, pure air, and pure water. These are rarely assured to the children of the masses, whose most serious handicap results from the lack of one or all of them.

Third.—Healthy habitation, where the environment may not violate the laws of hygiene or the living rooms, sleeping rooms, school rooms or location may jeopardize the health through imperfect sanitation.

Fourth.—Early care, maternal or otherwise, which will insure the capacity to resist disease by an immunity due to robust health. This includes safeguards which should be guaranteed by the state against communicable disease.

Fifth.—Intelligent training and judicious parental management, so that the unfolding mental and moral qualities are not misdirected or allowed to drift because of lack of guidance and proper discipline.

Sixth.—Instruction in the school, given by methods which will insure physical and mental integrity for the utilities of life and lay the foundation for a normal moral nature.

It will be impossible to amplify all these factors, but I will briefly mention three—the purity of the infants' food supply, maternal management and care, and school instruction.

THE PURITY OF THE INFANTS' FOOD SUPPLY.

Since it is true that maternal lactation is a disappearing function, much needs to be done to avert the consequences of the growing failure of our species to nourish its young. The fact of the necessity for substitute infant feeding touches the very heart of our subject, and the solution of the problem is vital to our life-saving work. Its importance is enhanced by the helplessness and great suffering of the infants who require it and the fact that they are of our bone and flesh.

Because substitute feeding is now forced upon from 50 to 60 per cent. of our offspring, the complex and almost impossible problem of obtaining clean milk for feeding infants deprived of

mothers' milk is engaging the earnest thought of the entire medical profession. The most far-reaching and fundamental step taken for the solution of this problem was the medical crusade for clean milk which was begun in this state in 1889.

The objects of this so-called pure milk movement were entirely professional and altruistic. The plan included the appointment of a Medical Milk Commission selected by a representative medical society, which, besides carrying on a system of medical supervision over this special method of producing pure milk, should also institute a contract control over selected dairymen by the employment of experts amenable to the Commission, which should report on four lines of scientific inquiry and inspection touching every detail of the sanitary, veterinary, biological and medical aspects of milk production, thus establishing every safeguard against the innumerable dangers of the milk supply. The Commission should first educate, encourage by reasonable demands and finally endorse the work of these qualified dairymen who would bring to our hospitals, sick-rooms or nurseries milk designed for the most exacting needs of the physician.

This programme has grown beyond our wildest hopes. Twenty years of successful work demonstrates its practicability. These commissions, with the resultant clean milk for clinical purposes, are organized in sixty-eight cities in the United States, and the growth of the movement has extended to Canada, Honolulu and several cities in continental Europe. Good milk, maternal or animal, is the largest material factor in the conservation of human life in the first year.

THE SEQUEL TO THE PURE MILK MOVEMENT.

The success of the Medical Milk Commission, whose work preceded by several years any systematic municipal control of the milk supply, was the opening of a door which revealed unknown possibilities for medical philanthropy which are very far-reaching. Medical milk charity has been made possible because of the ability to obtain safe and pure milk under the foregoing professional control,

From this altitude of clean milk achievement here and abroad, nothing is so capable of demonstration as the life-saving features of the milk dispensary. The work of this charity consists in taking tiny human beings, of which there are thousands in every large

city, who are the victims of starvation and disease from bad milk, putting them under slightly improved conditions of hygiene in their homes, giving the mother a few simple instructions on management and care, and supplementing these with clean milk adjusted to the individual needs of the baby. The result is seen in the reduction of the otherwise shocking mortality among this class, which, without this aid, is from one-fifth to one-third of all infants born, but, as shown in cities where this work is done, the mortality is only 5 to 9 per cent.—a saving of life of from 25 to 30 per cent.

The milk depot, milk dispensary, or "Goutte de Lait," has been conducted by many philanthropic agencies in this country and in Europe for the past sixteen years. An essential feature of these agencies, when properly directed for saving infant life, has been their strict control and supervision by physicians. As they were first conducted in Europe, so they should always be conducted as a medical charity by some medical institution or organization and not by a private philanthropist. In this way only can a proper surveillance be exercised, the truth assured concerning mortality statistics, the abuse of charity avoided and the unfortunate misrepresentation of facts prevented.

The "Goutte de Lait," or milk dispensary, was founded by Budin and Dufour in France in 1892-4. This was three years after the pure milk movement had been launched in this country. These medical milk charities, when properly organized, include the following features:—

First.—To continue to furnish good milk to infants leaving a hospital.

Second.—To provide suitable milk for sick infants brought by mothers to hospital clinics and consultations.

Third.—To conduct consultations for the instruction of mothers with nurslings and supplement their failure with good milk when necessary.

Fourth.—To maintain visiting nurses to gather statistics, give instruction in the proper use of milk and teach infant hygiene in the home.

MATERNAL CARE AND MANAGEMENT.

There are as many types of mothers as of temperament. Motherhood is poetic and beautiful, but it has come to pass in the vicissitudes of modern life that, like lactation, the natural

has given place to the artificial. Normal maternal instinct, self poise and resourcefulness have given place, in many instances, to apprehension and fear, with no capacity for good judgment.

The physical interests of the child involve, first of all, system and order in the routine care; regularity in the hours of sleep, of bathing, of feeding and exercise; proper judgment in the preparation and combining of suitable food. This includes the adjustment of the child's food to its individual and varying capacities, with judicious restraint to avoid the evil effects of overfeeding, or to meet its lowered capacities while sick. The selection of suitable rooms for its waking and sleeping hours as regards ventilation, sunshine and quiet. The thoughtfulness and judgment which will insure proper clothing and bed covering to suit the individual, the temperature or the weather.

The mental and moral correspondence of the child and its caretaker will involve in their intercourse the training of the little unfolding mind to recognize and not to fear its surroundings; to regulate and conserve the lavish waste of nerve force which the sensitive nervous organization is apt to suffer; to isolate it from much of the mental excitement too common in the surroundings of a baby and child; to keep the child quiet and away from those who would use it as a toy for the amusement of adults and visitors; to exert a controlling influence over it, exacting obedience by the exercise of a superior will tempered by kindness and patience. These are best accomplished through the influence of a nature characterized by self-reliance and self-control.

The moral correspondence will involve the unvarying exercise of truth, honesty and justice in word, thought and deed. These, with a sympathy which understands the child's nature and love, which is the most effective controlling force, it seems to me are all necessary to the development of a normal child and the conservation of its powers.

SCHOOL INSTRUCTION.

During the greater part of the developmental and formative period children are under the daily instruction of school teachers. This period of twelve years or more extends from the initial school age, which usually is five years, until the age of eighteen. The initial school age, in our opinion, should be seven instead of five years. We are told that at eight years the brain has attained

90 per cent. of its final weight, and before this age the nervous system undergoes the most rapid development of its functional activity, though not of its capacity.

The excessive physical and mental activity so noticeable between five and eight years, if taxed with study and school work, always results in fatigue and arrest of development. We have seen many instances in those who have been given a broad and liberal education of the wisdom of devoting this early period to a free, hygienic life, with a proper guidance of their mental powers without forcing them. It is the period during which the child should be allowed freedom and latitude in its natural activities. It is the period of play and "just pretend," and it is this fundamental principle which is the central thought of the true kindergarten.

There are in the United States from eighteen to twenty million school children. The work of conserving the interests of these unfolding and susceptible minds and bodies entails a great responsibility.

It consists in preparing the next generation for adult life, to succeed ourselves and carry on our labors, to maintain and develop our institutions, to assume and solve the larger problems growing out of them. We thus determine the character of the future citizen, the artisan, tradesman, merchant, parent, housewife, teacher and professional man or woman.

While most children are not adapted by inclination or mental capacity for the higher education given by the college or university, it is the function of the public schools to equip the various classes of children with the endowment necessary to fill the station in life to which they are best suited by natural adaptation without jeopardizing their bodily health and vigor.

This would mean for the larger number of children that at fourteen, the high-school age, or after two preliminary years at sixteen, they should be wisely grouped and graded for finishing courses in domestic science, cooking, dressmaking, homemaking, handicraft, the trades or commercial law. The school should attempt to unite and harmonize the native mental, moral and physical elements of the child, thus insuring the greatest efficiency of the individual.

The child's resistance and viability are determined for the most part before the school period; but now that so great a number are nourished by artificial and irrational methods in infancy

with faulty feeding and care in the years immediately following, many children enter school with unrecognized physical defects which unfit them for the rivalry of school-work, and they finally come out of the adolescent period seriously injured by the effect of educational overstrain.

There is still room for reform in school methods. One of the chief errors is the failure to recognize the varying limitations of children as seen when the same tasks are imposed upon those capable and incapable of mental concentration, or in heavily taxing the memory of those whose minds are elusive by nature. It would seem necessary that by some system of grouping the different temperaments and mental types should be dealt with by a flexible method of teaching that would give to each child the opportunity for its best work.

Also there is not enough consideration given to the division of time between mental work and play or attention to the need for ample mental change or recreation, mental repose or rest, mental stasis or sleep. As part of its recreation each child should spend a portion of every day in the open air with exercise enough to cause deep breathing. The school curriculum should include this in its requirements.

Mental repose or rest is as needful for brain capacity as is exercise for bodily vigor, but modern school methods forbid it by the amount of home work required of the pupil. In our opinion there should be no home work up to the sixth grade, and then half an hour daily up to the eighth grade, and greatly reduced periods for high school pupils. The fatigue entailed by the practice of giving high school students four hours extra work, or one from each teacher, is seen in their pale faces, nervous manner, lack of sleep and illy nourished bodies.

School children more than any other brain workers need long hours of sleep. At the beginning of school-life it should be twelve hours and at the end nine. The nervous system is a storage battery for energy, and it is during mental stasis or sleep that the battery is recharged.

Excessive mental labor without adequate sleep results in a loss of balance between the impulses of the general nervous system and the sympathetic or involuntary system. The overworked brain under the stimulus of the will becomes fagged, and the fatigue is seen in the flushed cheeks, rapid heart, the headache and insomnia which follow.

The methods of grading pupils should be revised, and while the developmental or anatomic age, rather than the chronologic age, promises to be a valuable aid for grouping school children, it is not the only index of intellectual fitness or bodily capacity. The individual must be studied with reference to its temperament, its intellectual antecedents, its mental characteristics, as well as its organic, functional and nutritional defects.

The selection of school teachers, with reference to their adaptability and fitness for teaching, is very far-reaching in its results. Great harm is done by temperamental and other defects in the teacher, as seen in a weak will, impulsive judgment, lack of self-control, and in those given to favoritism, vindictiveness and impatience. To neglect to require healthful moral fiber in the qualified teacher is to complete a vicious circle in any otherwise defective programme for the child in the school.

Finally, as physicians, it is one of our duties, as well as one of our privileges, to assume the rôle of teacher—first to our patients, then with discretion to the public, and, when opportunity offers, to our professional associates. The quarterly meetings of this society are designed to fulfill this duty to the profession and the public, and at our annual meetings we will bring to each other, for our mutual advancement, the results of our study or research and experience.

There are but few medical organizations known as pediatric societies. These are destined to multiply in number, and they are justified by the enormous amount of constructive work yet to be done in order that child life, from a medical standpoint, shall be fully protected.

Let us unite our plans in an effective programme for the decrease of morbidity and mortality among the young, whose congenital powers, if conserved, should insure a normal life from birth to old age.

This is idealism, but if we exert our influence strongly against the effects of defective inheritance, of bad environment, of malnutrition, of infection and contagion and parental and popular ignorance; if we forget self, disregard reward, and with persistent effort antagonize these evils, we shall accomplish the conservation of such forces as will protect and prolong the lives of thousands of children in the State of New Jersey.

PEDIATRICS AND OTIATRICS.*

BY EMIL GRUENING, M.D.,
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Pediatrics is not a specialty. It is the field of general medicine applied to the infant and child. It summons all specialties to its aid, and therefore also has need of otiatrics.

The otology of to-day is a science resting securely on anatomic, physiologic and pathologic bases, and using rational therapeutic methods to meet the clinical conditions. This is a development of the last fifty years, and in this connection we have to mention gratefully the names of Toynbee, v. Troeltsch, Schwartz, Politzer, Zaufal, Macewen and others. Let us now consider what bearing this new science has on the current practice of pediatrics.

The literature which I studied with this in view gives otology full credit for its present standing. In the "*Traité des Maladies de l'Enfance*," by Grancher and Comby, the chapter "*Les Maladies des Oreilles*" has been written by an otologist of note—Moure, of Bordeaux. In the five volumes edited by Hutinel ("*Les Maladies des Enfants*") there is no special chapter on the otology of children, and ear disease is there treated only as it occurs in connection with other diseases. The same remark applies to the "*Handbuch der Kinderheilkunde*," by Pfaundler and Schlossman.

Of the American literature I reviewed the "*Collectanea*" of Abraham Jacobi, who is abreast of modern thought in his otology as in all other subjects. I have also looked through the last ten volumes of the *ARCHIVES OF PEDIATRICS*, at present issued by LaFétra. We find during the ten years some abstracts of otologic papers, a few minor articles by otologists, and but two important studies by pediatricists, one by Dr. Francis Huber, on "*Otitic Serous Meningitis and its Treatment by Lumbar Puncture*," the other by Dr. Kerley, on "*Acute Otitis in Children*," 51 cases observed in private practice. In 44 of these the otitis was uncomplicated, 4 presented a mastoid involvement requiring operation, and in 3 there was an implication of the jugular bulb. From the scantiness of articles on the subject written by pediatricists in current literature, it would seem that aural examination is not as

* Read at meeting of American Otological Society, Washington, D. C., May 3 to 4, 1910.

widely practised and written on as the subject demands. Of American text-books on the diseases of children I looked over: "Diseases of Infancy and Childhood," by Emmett Holt; "Diseases of Infancy and Childhood," by Henry Koplik; "Treatment of the Diseases of Children," by Charles Gilmore Kerley; "Diseases of Infancy and Childhood," by Louis Fischer, and "Diseases of Infants and Children," by Chapin and Pisek.

All these authors accept the teaching of modern otology, though Holt makes decided reservations as to the indications for operative procedure. Holt considers the mastoid operation as one fraught with danger, especially for infants, and advises delay until the indications are imperative. He thinks that the operation is performed too frequently, and often with insufficient indications, and that serious intracranial complications but rarely occur.

It is unnecessary in this paper to state what are the indications for the mastoid operation. The criticism by Dr. Holt of otiatric surgery and its votaries does not agree with my experience. I have operated on mastoid in public in several large hospitals, general and special, in the presence of practitioners and students for more than thirty years. I always found that the mastoid could have been opened sooner with advantage to the patient. In no case did the finding justify further postponement. If we recall the indisputable fact that more than one-half of all brain abscesses, and more than one-half of all thrombotic diseases of all the sinuses of the brain are of otitic origin, then we see that there is no exaggeration in the statement that intracranial disease is likely to result from a deferred operation.

In a service of thirty years in a general hospital, where there were special otiatric and pediatric services, I had in the ear department at all times cases of suppurating ears in children. There were also cases of mastoid disease, cholesteatoma of the temporal bone, otitic serous and purulent meningitis, cerebral and cerebellar abscess, and thrombosis of the sigmoid sinus. These cases were recruited, in large measure, from the dispensary service, which directed the stream of cases to the various departments. I was also called to examine the ears of children in the pediatric service whenever they presented striking ear-symptoms. The number of these cases was small. If we remember that in this, as in other general hospitals, cases of measles, scarlatina, diphtheria, and other diseases of a similar nature, are not admitted, we can understand why aural affections, so frequently accompanying the

diseases mentioned, but rarely find their way into the pediatric service of a general hospital.

The foregoing facts largely explain the attitude of the pediatricist in private practice, especially in his relation to the otologist. The lack of aural material in his wards will lead him to believe that purulent middle ear disease, with its dire consequences, is of rare occurrence. The pathologist, however, tells us that ear disease in babies and children is very frequent, but remains unrecognized when there are no aural manifestations. Ponfick, for instance (Berlin. Klin. Woch., 1897), found purulent otitis media, with or without other diseases, in 91 cases out of 100 autopsies performed on material derived from the children's clinic in Breslau, cases in which the diagnosis had been made of bronchopneumonia and gastrointestinal catarrh. In the great majority of these cases the existence of the purulent disease of the middle ear was suspected by the clinician. Those ear diseases which announce their arrival with great pain, high fever, perforation of the drum, are readily recognized and cared for; while those insidious cases in which the pus remains in the tympanic cavity, and either acts through the blood or infects the respiratory or gastrointestinal tract, remain unrecognized and therefore do infinitely more harm.

I might say at this point that it is not an easy matter to examine the ear of a child, and when von Pirquet says that in cases of scarlet fever the drum-head should be examined without a speculum in order not to annoy the child, it is hard to see what knowledge we can derive from such a makeshift examination. The canal leading to the drum is often a very narrow tube, at times obliterated by fine hairs, wax, or scales, which have to be pushed carefully aside before the drum-head and its landmarks can be viewed. I consider an otoscopic examination in a child much more difficult than an ophthalmoscopic examination, yet we see that men of insufficient otologic training will perform paracentesis of the drum without previous accurate interpretation of the tympanic picture. The dab at the drum very often results merely in cutting the canal.

The great service we have yet to render to childhood is to recognize ear disease when there are no striking manifestations. This result will be obtained when the knowledge of the pathologist is applied by the clinician, and the ears of all sick children are frequently and thoroughly examined as a matter of routine,

TEMPERATURE CHANGES IN INFANTS AS AN INDICATION FOR THE MASTOID OPERATION.*

BY FRED WHITING, M.D.,
New York City.

The faculty of infants and small children for exhibiting sudden and extreme exacerbations of temperature upon slight provocation has long been one of the well recognized privileges of childhood, and when not associated with an actual or impending surgical condition has come to be regarded by the medical adviser with a considerable degree of complacency. This mental attitude of the doctor has gradually exerted a distinctly educational and disciplinary influence upon parents of the more intelligent class, until, in the present year of grace, we find that notwithstanding most mothers have a well-developed and pernicious thermometer habit, they are more amenable to reason and less liable to become hysterical upon finding a sudden and high temperature present in a sick child than parents of a similar social status were, but a few years ago, wont to be. Much of the credit for the institution and successful prosecution of this crusade of parental enlightenment must be attributed to the observation and teaching of the pediatricians, who, since the establishment of babies' wards in all the large hospitals, have enjoyed unrivalled opportunities for the critical study of the diseases of children collectively and in large numbers, and under circumstances most favorable to a just estimation and determination of their symptomatic value.

With large numbers of beds at their disposal, provided with adequate nursing and equipment, and unhampered by well-intentioned but misdirected and disconcerting parental influences, the pediatricians have been able to observe the course of acute diseases in an unprejudiced and scientific manner. The result of such experience has undoubtedly been to minimize their respect for temperature manifestations when unattended by other significant evidences of systemic disturbances. Indeed, to such an extent has wide experience justified them in this attitude that

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they have come to regard high temperature in infants as by no means convincing evidence of any serious condition, and we must be sufficiently magnanimous to acknowledge, however reluctantly, that the efforts of these gentlemen have, to a certain extent, modified our former embarrassment at the peremptory and insistent demands of patients for an immediate interpretation of the precise significance of each exacerbation of temperature. At the present day the surgeon's thermometer is as much a part of the regular equipment of a well ordered nursery as is the baby's bottle, and contributes in no small degree to the needless apprehensions of the mother and to the inconvenience and annoyance of the doctor. But it is useless to complain, for the domestic use of the thermometer has come to stay. Only let us pray that the day of the domestic microscope and culture tube may long be delayed.

We have all of us had opportunity to observe many cases of illness in infants in the course of which sustained high temperatures of unaccountable origin have vexed and confused our diagnostic skill, but have not caused any great anxiety, for the reason that they were unattended by any recognizable focus of suppuration or by any well defined and alarming physical signs indicative of disease of vital organs. Such cases, in large numbers, pass on to recovery and are characterized as gripe, or are designated by some similarly uncompromising term, and we are never the wiser for our observation of the case. The diagnosis is not made, but no alarm is felt at any time, because of the absence of focal symptoms. But should it happen by any chance that a patient exhibiting such temperature phenomena is suffering from acute suppurative ear disease, we are at once disposed to assume that the disquieting manifestations are all attributable to the purulent process and to ascribe to the symptoms a gravity of significance which greater experience demonstrates to be unwarranted.

A not infrequent experience which the babies' wards in the hospital furnish is an opportunity to observe two infants occupying, perhaps, adjoining beds and exhibiting nearly similar temperature manifestations—either continuously high ranges or rapid and perhaps excessive fluctuations. Neither case exhibits, on physical examination, signs indicative of serious involvement of any vital organ. Blood counts of the two patients, showing moderately high leukocytosis with a reasonably high polynuclear count, throw no especial light upon their conditions. But while the one case, having no recognized focus of suppuration, is re-

garded with interested speculation only as to the cause of the temperature, and without further concern, the other patient, having a suppurative otitis media, is immediately invested in our estimation with a degree of importance to which, in the majority of instances, the subsequent course of the illness demonstrates it not to have been entitled. We find difficulty in convincing ourselves that a sick infant may have a suppurating ear, which is nothing more than an incident of its illness. *We otologists are prone to take the view that an inflamed ear when attached to a sick infant must be responsible for all the evidences of illness which the child presents.*

There is a reasonable excuse for the otologist thus laying undue stress upon the probable consequences of suppuration of the ear, for we have all of us had opportunity to observe similar conditions occasion the most serious and rapidly fatal results; and when a doctor has once experienced such an unfortunate outcome in consequence of attempts at conservative treatment he cannot divest his mind of the constant fear that such a deplorable experience is likely to repeat itself. Moreover, he knows that the dangers to be apprehended from an early mastoid operation in competent hands are few indeed, and he is perhaps not to be blamed if he prefers to expose the patient to the discomforts of an unnecessary operation rather than to assume the responsibility of the remote risk with which all delays in operating must inevitably be attended.

It requires the most careful weighing of conditions and adjustment of balances to enable us properly to differentiate between the relative unimportance of a set of symptoms which appear in a given case unattended by suppuration and the precise value of similar manifestations when exhibited in another case in which suppuration is present. It is evident that we can hardly overestimate the value of the symptoms if they are due to sepsis, and it is equally certain that we can afford to disregard them if they are not of septic origin.

An experience which the recent winter has several times furnished in the practice of the writer has been to be called upon to attend an infant which in the course of grippe has developed otitis media. Under the influence of this double infection a very high temperature has developed, which, notwithstanding a free myringotomy and evacuation of pus, has persisted for some days, in certain instances, with no considerable remission, and in other

instances with very decided daily fluctuations, to the great anxiety of the family and concern of the doctor. Many such cases have rewarded a patient and conservative course of temporizing by gradual reduction of temperature and complete recovery without operation. In fact, so frequently have I experienced this result during the last year that I no longer feel disappointed when upon the performance of myringotomy in the presence of grippe there is not an immediate and pronounced reduction of temperature. Grippe infections require some days for their elimination from the system, and although the paracentesis of the membrana tympani has relieved pressure and established drainage, thus accomplishing all that we may properly expect from it, it cannot, at the same time, eliminate grippe infection. This is a matter of days. The question, then, narrows itself down to a consideration of temperature, and we may propound the question of whether or not we are justified in advising mastoid operation during an acute otitis media in which, without other assignable cause, the temperature remains high, or in which rapid and considerable fluctuations of temperature are present without the usual local inflammatory evidences of the tympanum and mastoid to guide us.

We must bear in mind the fact that infants and small children exhibit high temperatures upon the slightest provocation, and that a condition which in an adult would cause only a slight elevation of temperature, 101° F. perhaps, or less, and to which we should attribute no significance, will in an infant cause a temperature elevation quite out of proportion to the actual gravity of the condition, but is apt to be regarded with the same degree of consideration as a similar high temperature in an adult. Any such estimate of temperature values is based upon faulty observation, and greater experience will, I believe, tend to correct such errors. It seems to the writer that the same rules governing the appearance of local inflammatory evidences in adults may, with equal safety, be insisted upon in infants.

In the early years of life the bony structures are very soft and unresisting, and pus in the mastoid is apt to demonstrate its presence by early evidences of mastoid periostitis, redness, swelling, edema, and, in a short time, by subperiosteal accumulations of pus. In fact, a daily widening experience with a large children's service in a hospital is converting the writer to the view that in infants and children we may safely wait for the same classical signs at the fundus of the ear, namely, swelling and bulging of

the drum, with sagging of the membranous portion of the meatus, and at least convincing evidence of tenderness of the mastoid region, before proceeding to operation. It is a frequent experience in all large clinics to have children brought for treatment with red and swollen mastoids and with large subperiosteal accumulations of pus, the so-called neglected cases upon which home remedies have been exhausted. Still, we find that such cases, as a rule, do well upon operation. They represent the extreme results of expectant treatment, home carelessness or neglect—call it what you will—and there is no reason to suppose that any great number of such neglected cases die at home and are not seen by doctors; wherefore it would appear that, at the worst, all that is likely to happen from waiting for convincing signs of the presence of mastoiditis is a subperiosteal abscess, of which brain complications with very young children are rare.

It is not my intention to burden you with a long series of histories, although many typical cases have fallen under my observation. I shall content myself with reading one brief history and exhibiting one temperature chart.

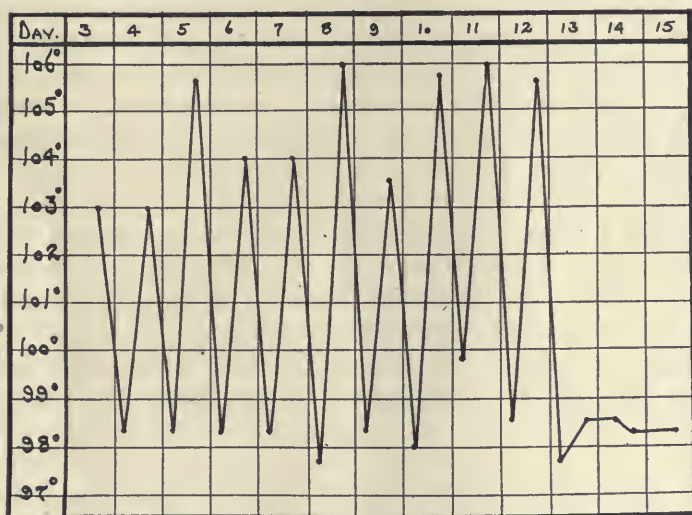


FIG. 1—Showing septic temperature following myringotomy.

The chart shows the temperature changes exhibited during ten days by a child one year of age which was under the care of a well-known pediatrician of New York, who informed me that he could find no physical signs which might account for the tempera-

ture; he had made a diagnosis of grippe and asked me to examine the ears, suspecting them to be the probable source of the startling temperature picture here presented. Upon inspection, I found that both drums were bulging, and myringotomy was performed, evacuating purulent fluid from each tympanum. There followed for ten days one of the most startling pictures of septic-pyemic fluctuations of temperature that it has ever been my experience to observe, and the chart is here offered in evidence. It shows daily variations of from six to eight degrees for ten days, during which period the child at no time appeared particularly ill, and, when her temperature was low, would sit up in bed, play with her toys, take nourishment, and evince her usual interest in childish matters. With the onset of the high temperature, she became irritable and drowsy, but at no time had she a septic appearance. A copious discharge appeared from each ear, the drainage was apparently perfect, and myringotomy was not repeated. A smear made from the discharge showed the infection to be streptococcus. No blood count was made.

With the subsidence of the high temperature, she made an uneventful recovery. At the time the observation was made, blood cultures had not been resorted to, and only the confident trust reposed by the parents in the assurances of the doctors that the child was not in danger prevented the performance of a needless double mastoid operation. Had the parents been of the nervous and apprehensive kind we could not have controlled them and would have been obliged to operate.

When a focus of suppuration exists which we can clearly see, as, for instance, a suppurating ear with the capabilities of which for producing serious trouble we are all well informed, it is difficult for us to ascribe manifestations which may accompany such suppuration to the possible existence of other causes which we not only cannot see but cannot convincingly demonstrate to be present. None the less, it involves no great tax upon the memory of any of us to recall one or more cases in which we were strongly disposed to operate on the mastoid, notwithstanding the absence of many of the classical symptoms, because of the persistent high or rapidly changing temperature, but upon summoning sufficient courage to wait a little longer the solution of the difficulty was suddenly reached in the discovery of a central pneumonia, a pyelitis, an adenitis, one of the exanthematous diseases, erysipelas, or some obscure gastrointestinal condition. The causes of tem-

perature are so numerous in children that we must be ever alert for their detection, lest some unsuspected agency contribute to our lasting mortification.

I know of no experience more valuable to an otologist than a close association with a large children's service in a hospital, for he there learns to interpret the significance of suppurative ear diseases not only from the somewhat radical standpoint of the ear surgeon, but also from the ultraconservative point of view of the pediatrician. The pediatrician, with insufficient ear experience, is likely to be too conservative; the otologist, with insufficient experience in children's diseases, is equally prone to be too radical in method and hasty in judgment. The pediatrician sees everything from the viewpoint of the disease as it affects the majority of children, and does not allow sufficiently for the vagaries of the disease; the otologist, in his lack of experience, is apt to apply the same significance to high and fluctuating temperatures in infants that he would ascribe to the same temperature in adults. The pediatrician knows that a very slight disturbance will send up a child's temperature, and until he can see the exact cause he refuses to believe that the condition is important. His conservatism is a good balance wheel on the radicalism of the otologist, and a combination of the two experiences is most valuable. The writer believes that the two classes of practitioners are gradually drawing nearer together in their estimate of the values of symptoms presented by infants, and are becoming less belligerent and more respectful to each other.

The otologist cannot forget that unfortunate case upon which he once operated because of unexplained and persistent high temperature, and in which he encountered normal mastoid structures, while the central pneumonia which had been the cause of all the disquieting symptoms obligingly revealed itself on the following day, and the derisive smile and patronizing air with which the pediatrician on every possible occasion reminds him of his blunder causes his sin of commission to linger long in his memory. As a parallel experience, the pediatrician has a vivid recollection of the jugular bulb thrombosis which terminated fatally through his insistent and fatuous dilatory measures, in one of his most important patients, a sin of omission which the otologist would be quite too magnanimous in spirit ever to recall to his mind. But such experiences, emphasizing to us as they do the fallibility of our diagnostic acumen, are teaching valuable lessons of mutual de-

pendence and respect, and will, I trust, in the near future, result in establishing a unanimity of opinion regarding the relative values of more or less constant symptomatic phenomena over the interpretation of which we are at present widely at variance. In the treatment of ear diseases in children the otologist and the pediatrician should be complementary to one another—neither is sufficient to himself—together, they make a strong proposition.

To what extent may the blood count in infants and young children be relied upon as a determining factor in deciding us to operate in cases where the only apparent urgent symptom is temperature? The count will frequently exhibit the most startling total and that, too, when the symptoms present are not calculated to arouse any great anxiety as to the patient's welfare. Leukocyte counts of 40,000 to 50,000 are not uncommon in certain diseases from which children speedily recover, and Dr. Holt, in consultation, recently cited a case he had just seen, in which the count showed 120,000 leukocytes, and yet the child did not appear very ill and recovered without even the aid of a diagnosis. The wide variations of the total count from day to day during the course of an ear inflammation when associated with some attendant disease are at times very perplexing and disappointing, so much so as often to compel us to disregard them entirely. They offer their greatest diagnostic assistance in those instances in which, when repeated at brief intervals, they show a numerical regularity or a disposition to a steady ratio of increase. The utmost dependence that can be placed upon the count under the foregoing conditions is to lend a certain degree of corroboration to other strongly indicative signs when present; but under no circumstances can the blood count be relied upon to ratify a diagnosis of mastoiditis, the only other evidence of which is high temperature.

With the introduction and perfecting of blood culture methods, we have gained a valuable diagnostic aid in determining the significance of rapid and excessive fluctuations of temperature, for while a negative culture does not prove that no infection is present in the sinus, it is at least strong presumptive evidence of the absence of bacteriemia, and an experience of eighteen months with a large number of suspected cases of sinus phlebitis has exhibited so few failures and so many successes of the method that I now place much reliance upon it when performed by men of sufficient experience. The technique of blood culture in infants and small children presents certain considerable difficulties, but they

are by no means unsurmountable, and the diagnostic value of the procedure has, it seems to me, been established beyond all reasonable doubt. In any event, a negative culture is very reassuring to me when I am treating a patient with a suppurating ear who exhibits wide fluctuations of temperature unaccompanied by physical signs of mastoid disease.

Far be it from me to advocate delay in operating for mastoiditis in children after convincing signs of the disease have manifested themselves at the fundus of the ear; but equally to be deprecated should be the attitude of the surgeon who with injudicious haste proceeds to operation simply because high temperature is present and it cannot be demonstrated that mastoiditis does not exist. To operate for mastoiditis in infants upon temperature manifestations supported only by blood counts and without corroborative evidence in the form of inflammatory changes at the fundus of the ear displays not only a lack of conservatism but a selfish disregard for the welfare of the patient.

DISCUSSION OF PAPERS OF DRs. GRUENING AND WHITING.

DR. CHARLES G. KERLEY, of New York City, said that the recognized failure of clinicians to discover acute ear diseases in children and the great harm which may thereby result reverted back to the otologist and the medical school. Undergraduate instruction in otology was very defective. Every year he examines men for hospital appointments whose knowledge of the subject is of the most casual nature.

The available literature on this subject previous to the past few years was misleading. The advances in otology as applied to pediatrics had been made during the past five or six years.

When he prepared the article to which Dr. Gruening referred a very keen search through the literature failed to reveal anything, which gave very much data concerning the symptomatology and treatment of aural diseases or suspected aural disease in children. Most of the data found related to the symptom of pain. The otologist taught that pain, as evidenced by tugging at the ear, head-boring, crying, tenderness on manipulation, was one of the earliest symptoms of otitis in children. This is absolutely wrong. In a series of 72 cases reported in the article referred to, 69 per cent. showed absence of this element, pain, which is considered so important. Since that time Dr. Kerley had seen at least 200 cases, and the percentage holds good to the present time. The

younger the child the less evidence is there of pain and the less frequently is pain encountered. In 20 cases he had noted restlessness, which was relieved when the ear was opened. Pain is a symptom of very little significance from the diagnostic standpoint. He had called attention to this matter in his book, emphasizing the necessity for the early examination of the ears of children, and stating that otitis media is more frequently overlooked in children than any other disease. He agreed with Dr. Gruening that the pediatricist should be as familiar with otoscopic examination as with any other method of examination. The symptom which he had found most constant in otitic disease in children was fever. Many elevations in temperature that were otherwise not to be explained proved, upon bacteriologic examination following paracentesis, to be of aural origin. Men should be taught to recognize otitis and how to open the drum membrane (a simple operation), and that great harm may result, mastoid and sinus involvement, from this not being done. The matter of differential diagnosis in suspected aural conditions should be emphasized. The otologist, perhaps, places too much reliance upon the symptom of temperature elevation. Temperature in the child is a very unreliable sign to base a diagnosis upon and should be considered in connection with other symptoms. Grippe and pyelitis may be factors in high temperature without any objective sign. Because a child has a discharging ear and fever it does not mean that the ear or adjacent structures are necessarily the sole occasion of the fever. At the same time a case proven negative with the exception of the infected ear with continuous fever might warrant mastoid exploration, even in the absence of prolapse and other canal changes. A symptom of much value in the diagnosis of mastoid disease rested upon the profuseness of the discharge. The cases with very profuse discharge and with persistent, widely varying temperature often meant mastoiditis. He had seen with Dr. Whiting such a case recover without operation, the condition of the child being critical to the degree of making the operation more dangerous than the disease.

As to mastoid tenderness, crying may be elicited from any child by sufficient pressure over the mastoid. This sign may be of importance and again it may be of very little value.

He did not agree with Dr. Gruening with reference to the lack of material for observation, as the children's hospitals, and the children's wards of general hospitals furnish ample material. The importance of aural disease in children has been appreciated only within the last few years. The papers of Dr. McKernon and his own, published five years ago, had done much to direct the attention of the medical profession to the right diagnosis of otitis media in infants and young children as well as to call attention to the dangers of overlooking the otitis.

DR. LINNÆUS E. LAFÉTRA, of New York City, said with the general tenor of Dr. Gruening's paper he was in hearty accord.

The more ears were examined, the more often physicians found that the tympanic cavity was the site of inflammation and the cause of fever and fretfulness. It was very common, in the course of coryza or bronchitis, to find the sheen on the ear drum to be dulled or that there was a little redness or fullness at the upper part of the membrane or along the handle of the hammer. As our honored Jacobi had so well taught, an otherwise unexplained temperature in a child was most likely to be due to an otitis media. Otitis media was exceedingly common in children. Personally, Dr. LaFétra had more need of the aurist than of any other consultant. There was hardly a week from February to May each year that he did not have to call the aurist to his aid, and often three or four times a week. For instance, during the week just past he had 3 cases of single and 1 case of double otitis demanding paracentesis; and, in addition, 2 other cases that subsided without incision. He thought Dr. Gruening was right in saying that the aurist could be, and was, of the greatest help to the pediatricist. In the past ten years of practice he found that he had seen just 7 cases of otitis media that were *complicated*. He could not say how many cases of otitis he had seen, but these complicated ones represented not more than 1 or 2 per cent. of the total number of cases. Naturally, he attributed this small proportion of complicated otitis to routine examination of the ears, whether the child made any indication of ear pain or not. It was to be emphasized that infants do not localize pain well; often appearing to have merely abdominal distress or being simply fretful or biting on the fingers with the gums. The early and repeated incision of the drum membrane, as the otologists have taught, saved most cases from any further operation.

As to the attitude of the pediatricist toward the larger operations, he thought this was largely due to two factors: First, the pediatricist sees otitis in its early stage and sees it get well in the vast majority of cases after simple incision, while the aurist sees in his hospital and consultation practice the neglected or severe cases that are apt to go on to serious complications. Naturally, the prognosis of each man reflected the background of his own experiences. Each of us could learn from the other. In regard to the more serious operations, Dr. LaFétra thought it was important for the aurist to have definite local indications before performing them. Three times in the past two years he had with advantage persuaded the aural surgeon to abstain from performing the mastoid or the sinus operation, which was urged because of the great fluctuations of temperature after paracentesis. In one instance the surgeon was sure that these variations of temperature must mean sinus involvement and mastoid suppuration, although he could not demonstrate it by any local signs.

The blood count in these instances might tend to confirm the surgeon in his opinion, since high leukocyte and high polynuclear counts are common. Unless, however, the aural surgeon could

be confident, from local signs, that the mastoid was involved, he ought not to operate. General symptoms, and especially temperature fluctuations, were not a safe guide in children, especially in cases of influenza. In connection with influenza cases, Dr. LaFétra passed around a chart of a patient fourteen months old, showing an extreme range of temperature fluctuation. If this child had had, as is very common in grippe, an otitis media, the temperature alone would certainly seem to indicate some serious ear complication. The more experienced aurists were inclined to disregard temperature as a reason for mastoid operation. The younger men were more apt to be radical. It involved much more courage to wait in such cases than to operate. As regards the operation, the position of pediatricists might be stated as follows: The temperature alone is an unsafe guide, high leukocyte count, with relatively high polynuclear, is not a sufficient indication, particularly in cases of grippe. Persistent or recurrent discharge, when not accompanied by sagging of the posterior superior wall or by local signs of mastoiditis, is not sufficient. The aurist should be sure of his local signs before exploring the mastoid.

In closing, Dr. LaFétra said that Dr. McLane used to tell, in his lectures on obstetric operations, that no obstetric forceps is complete without a catheter tied to it. He would say that to the pediatricist no stethoscope was complete that did not have an ear speculum attached. Of the two instruments there was more real need by the children's specialist of the ear speculum. We could make a diagnosis of pneumonia or bronchitis without a stethoscope, but we cannot know what is going on in the ears without a speculum.

DR. EDWARD B. DENCH, of New York City, recalled having seen with Dr. LaFétra the case in which sinus thrombosis was suggested. This was merely mentioned by him as a possibility, but he would not have operated. A single rise of temperature, with a polymorphonuclear count of 79 per cent., was not sufficient indication for operation. The chart was interesting and the case itself was interesting. In his text-book he had mentioned the temperature, boring at the ears, and other symptoms, and he had also called attention to the fact that the temperature may be due to other causes, but that in cases of unexplained temperature the ears should always be examined. The instruction given in medical colleges at the present time is a great deal better than that of a few years ago. The simple and acute diseases of the ear are being taught; the chronic diseases can be learned later. Otoscopic appearances in these cases are not always characteristic. Every year he sees cases in which redness of the drum membrane is not a prominent symptom, even where the disease has lasted for some time. He cited a case which he had seen with Dr. Kerley in which the drum membrane was so little red that it did not seem to offer an explanation of the temperature fluctua-

tions, and yet upon incision pus was found. There may be very little displacement of the membrane by the fluid, and the actual condition is apt to be overlooked. The mortality rate in infants upon whom the mastoid operation has been performed is not very high, according to the speaker's experience. At the New York Eye and Ear Infirmary he sees a great many cases of mastoiditis in infancy, all severe cases, with the symptoms well established. He sees on his service perhaps as many as 50 such cases within a year, not more than one or two of which are lost. At one of the general hospitals with which he is connected he is very often asked to perform the mastoid operation as a conservative measure. He agreed with Dr. Kerley concerning the eliciting of tenderness in children. Most children will cry if sufficient pressure is exerted over the mastoid. The fact is often overlooked, however, that acute otitis uncomplicated in children tends to clear up. At the end of a week or two the discharge clears up, the mucopurulent discharge becoming less purulent and less profuse. If it continues for a number of weeks there is some trouble beyond the middle ear. He questioned whether it would be more conservative surgery, where the discharge continues, to operate before the disease extends to the ossicular chain. At St. Luke's Hospital, not long ago, a double incision was performed, the discharge persisted, and this was the only symptom, except that the child was poorly nourished. After about two months it was decided to do a mastoid operation, when extensive caries was found. The child then began to improve very rapidly. The mastoid operation should be performed not for the acute symptoms, but for the chronic condition, which must result in some impairment of hearing. The blood count in his hands had always seemed unreliable in these cases. The differential count is more important than the leukocyte count. One must depend upon the general symptoms of the case, together with the blood count. He had never opened the mastoid of an infant and found it normal.

DR. GEORGE L. RICHARDS, of Fall River, Mass., asked if there is any relation between acute pyelitis and otitis media, citing a case which suggested that there might be some such connection.

DR. ARTHUR B. DUEL, of New York City, said that soon after the appearance of Dr. McKernon's classical paper on "Primary Jugular Bulb Thrombosis in Children, as a Complication of Acute Purulent Otitis Media," he was appointed otologist to the Babies' Hospital. He was filled with the ideas presented in the paper. On observing several infants in whom wide vacillations of temperature took place, and who also had suppurating ears, he felt it his duty to advise exploration of the jugular bulb. Dr. Holt did not concur with this opinion. At first he regretted this, but as time passed and he saw one after another of the children recover without operation he was pleased. In one case he had the opportunity of seeing an autopsy on the child, who had died of

pneumonia, and greatly to his surprise he found the bulb and sinus clear. Shortly after that he read a paper in which he called attention to many of the points mentioned in Dr. Whiting's paper; also stating that it was impossible to conclude, on temperature alone, that an operation was indicated on the sinus or bulb in children under two years of age. The mortality in these young infants after operation is considerably higher than in adults. Success in operating upon young children has been largely increased and the mortality lessened since surgeons have been more careful in the control of hemorrhage. Loss of blood is often the cause of the fatality in the operations under discussion. Attention was called to the difference in the types of children found in the special hospitals and in those like the Babies'. The mortality has been greatest in patients known as "feeding" cases, where assimilation is bad and vitality low. Such patients do not die as the result of operation *per se*, but because of this injury added to the already serious condition. They would undoubtedly die without operation, but death is hastened by this added shock. The otologist who operates upon an infant under two years of age needs the pediatricist to help him in the subsequent care of the case just as much or more than the pediatricist needs him to do the operation. At the Manhattan Eye and Ear Hospital a pediatricist takes care of the subsequent feeding of infants after operation.

DR. JAMES F. MCKERNON, referring to the statement that one should not operate upon the symptom of fever alone, said that after all diseases have been eliminated by the general practitioner and the pediatricist one must come back to the original focus for an explanation of the temperature. The ear will furnish the explanation. On the other hand, a high temperature of septic origin is indication enough for operation. He concurred in what had been said concerning temperature alone, but emphasized the fact that there are exceptions, and that these occur very frequently. He cited a case of streptococcic infection, which was seen by Dr. Whiting, in which there was absolutely no indication of the disease from the physical standpoint, except the temperature, which went to 105°F. There was no change in the fundus, no mastoid tenderness, and yet the mastoid was necrosed from one end to the other. The temperature fell, then rose again, and the other ear was found to be involved. This showed the classical symptoms which are associated with involvement of the mastoid. With high temperature, without the classical physical signs, when other diseases have been eliminated, one must come back to the ear to account for the symptom.

DR. FREDERICK L. JACK, of Boston, cited a case he had recently seen in consultation in which repeated high temperature was absolutely the only indication of mastoid involvement. The mastoid operation was advised, and the diagnosis verified.

DR. B. ALEXANDER RANDALL, of Philadelphia, emphasized the

fact that these cases have a strong tendency to the formation of nonseptic thrombus and the closing off thereby of the jugular as completely and safely as it can be done by ligation. In many such cases where autopsy is made the jugular is found to be entirely closed. Even the cavernous sinus may be thus involved, as in a case which he reported some years ago, and its lumen re-established or collaterally substituted later.

DR. GRUENING, in closing the discussion, said the statement attributed to von Pirquet, which Dr. Kerley questioned, viz., that in scarlet fever the ear of the child should not be examined with the speculum and could be examined by merely drawing the ear back, because the introduction of the speculum causes annoyance to the child, is found in the article on scarlet fever in Pfaundler and Schlossmann.

With reference to that imponderable something called intuition, which the pediatricist attributes to the otologist, he said many things are involved. First of all, the amount of pus, mentioned by Dr. Dench, forms such an indication. This may be wiped away and immediately it wells up again. It cannot come from the middle ear; there must be a cavity from behind which furnishes this pus. It is not necessary that there be visible changes in the canal, but this, in connection with the temperature, would be indication for operation. This cannot be communicated, but belongs to the *imponderabilia* of which the pediatricist speaks. Without tenderness, without pain, without temperature, the otologist sometimes recognizes such cases and knows that there must be mastoid disease where there is absolutely no text-book symptom to guide him. These cases are often met with, and it is very important that the pediatricist should become acquainted with them. It is not easy to get the tympanic picture. Otology should not be taught by lectures, but at the bedside or in the clinic, where the student should be taught to inspect the drum membrane of the adult and of the child.

DR. WHITING, in closing the discussion, said that at the present time otology is taught in one institution with which he is familiar, and probably in others, after the method upon which Dr. Gruening insists. While it is taught didactically to a certain extent, the students are also required, in small sections, to examine ears. Notwithstanding the views expressed by some of the speakers, temperature alone seldom guides one to operate. He mentioned, in this connection, a case seen in consultation with Dr. Kerley. The amount of discharge from the ear was tremendous, and the temperature exacerbations were such as to preclude operation, and it made a perfect recovery. Dr. McKernon's contention is quite true; occasionally one encounters a case which goes contrary to all established laws and with nothing but temperature to guide us we must operate. But such cases usually look sick and show prostration out of proportion to the other manifestations of the disease.

PRACTICAL POINTS IN THE MANAGEMENT OF POLIOMYELITIS AND ITS SEQUELÆ.*

BY HENRY LING TAYLOR, M.D.,
New York.

Acute poliomyelitis, or infantile spinal paralysis, occurs in epidemics and also sporadically in most of the civilized countries of the world. Recent extensive epidemics in New York, Massachusetts, Wisconsin, Nebraska, Scandinavia and Germany have drawn renewed attention to its frequent occurrence, wide distribution, and disastrous consequences. It is predominantly a disease of midsummer and early autumn, and of the first years of childhood. In the New York epidemic of 1907 over 60 per cent. of the cases occurred before the fourth birthday, and over 90 per cent. before the sixth. It is, however, much more common in adolescents and adults than is usually supposed. In a group of 4 cases occurring in Southampton, N. Y., in the autumn of 1908, the ages were infancy, thirteen, nineteen, and forty years, respectively. Many of the adult cases have passed under the title of Landry's paralysis, or under other designations. A recent case in a youth of eighteen was diagnosed as typhoid fever, and the subsequent weakness, lameness, and wasting in the right leg were explained as a complicating neuritis. Numbers of cases of scoliosis in young adults have been traced to a previous attack of poliomyelitis, which in some instances left no permanent limb palsy, as in the case of a woman of nineteen who had an attack of fever and weakness in the limbs, followed by lameness, which passed off entirely. Two years later there was a severe scoliosis with partial palsy of the back and abdominal muscles, for which she sought advice.

The negro race in America seems to be less susceptible than the white. Further study is needed as to the geographical and racial distribution of poliomyelitis. An investigation of its occurrence and the communicability has been undertaken by the Massachusetts Board of Health since 1907, and it is to be hoped that New Jersey and other states will join in a systematic statistical study.

* Read before the First Annual Meeting of the New Jersey State Pediatric Society, Atlantic City, N. J., June 27, 1910.

Poliomyelitis attacks all classes, the healthy as frequently as the delicate. It often occurs during teething, also after overheating and overexertion, especially if followed by a sudden wetting or chilling. It also not infrequently follows within a few hours or days after a definite moderate trauma, such as a blow or a fall.

In epidemics, two or more cases in a family or house have occasionally occurred, but in the New York epidemic of 1907 700 houses were reported with one case in each, and only 23 with two (18) or three (5). The disease has been communicated to monkeys, and from monkey to monkey for several generations, by Flexner and others, and the virus has been found to be filtrable and ultramicroscopic.

It has been definitely shown by Strauss and others that an extensive small cell infiltration surrounds the vessels of the infected area; that the cord is edematous; that the motor cells atrophy secondarily; that the pia of the spine, bulb, and base of the brain are regularly involved, even in those cases showing no cerebral, bulbar, or meningeal symptoms.

The onset is sudden, usually with fever and constitutional symptoms for a few hours or days, and the palsy follows in a short time. Prostration and inability to walk for a considerable time are common. It is now recognized that bulbar, cerebral, facial, neck, and trunk palsies are not very rare. Indeed, Wickmann, who studied the Swedish epidemic of 1905, divides the disease into eight clinical types, as follows:—

- (1) Spinal poliomyelitis type.
- (2) Ascending or descending palsy.
- (3) Bulbar or pontine type.
- (4) Cerebral type.
- (5) Ataxic type.
- (6) Polyneuritic type.
- (7) Meningeal type.
- (8) Abortive type.

In epidemics there are numbers of quickly fatal cases, also cases without palsy, or in which the palsy soon clears up. The writer has notes of cases showing dysphagia, aphonia, ocular and facial palsies, and temporary palsy of the bladder and rectum. Unconsciousness and delirium are rare, except in the fatal cases, but apathy and moderate stiffness and retraction of the neck are not uncommon. It is well, however, to bear in mind that the

spinal is the typical and common form, and that the other types are exceptional.

The limb palsies are of very irregular distribution and often escape observation until the prostration abates and the patient tries to get up. In other cases neuromuscular soreness and pains, which are very common, mask the palsy and often lead to a diagnosis of rheumatism. In a few cases there is no history of an attack, but lameness is noticed after the child begins to walk. In others, the child may wake up weak or lame in one leg without constitutional symptoms. Better observation would doubtless reveal fever in many such cases. A few cases with moderate palsy never stop walking.

Abdominal palsy is quite common, though often overlooked. The New York Committee reports only 8 cases from their material of about 750. The writer has notes of 16 cases where the abdominal muscles were paralyzed on one or both sides, indicated by a local or general protuberance of the abdomen, or a bulging caused by coughing or crying. In all of these cases there was arm palsy, and in all leg palsy at first. In nearly all the arm palsy recovered; permanent leg palsy remained in nearly all, but was not always bilateral or severe. The abdominal palsy was sometimes in the upper part, sometimes in the lower, sometimes in the loin, on one or both sides; in two cases the entire abdomen was affected. The abdominal palsy was found in both fresh and older cases, and was sometimes an important factor in increasing the disability in sitting, standing and walking. In half the cases there was marked or severe scoliosis.

The palsy, whatever its distribution, is always a palsy of relaxation and wasting, never spastic. The deep reflexes of the affected part are usually obliterated, but in a few cases of leg palsy the knee reflexes are exaggerated, as pointed out by Pierce Clark. Vasomotor paresis, shown by blueness and coldness, is nearly always present in the affected extremity. Wasting begins quickly and, unless the muscles soon recover, is permanent in some degree. It usually involves the bones and other tissues as well as the muscles. Growth is impaired, and a difference of one or two inches in the length of the limbs is common after a few years, when one extremity is paralyzed.

The active process is over in a few weeks, and there is nearly always a strong tendency to spontaneous improvement in some, at least, of the paralyzed areas. Some muscles recover entirely,

CASES OF POLIOMYELITIS WITH ABDOMINAL PALSY.

No.	AGE	SEX	AGE ONSET	PALSY AT ONSET	PALSY PERMANENT	ABDOMEN	SCOLIOSIS	PRESENT CONDITION
1 H. C.	13 yrs.	m.	16 yrs.	Arms and legs	Left leg	Left upper and lower	Marked, to left	Can walk a mile
2 E. E.	2 yrs.	m.	1 yr., 6 mos.	Arms and legs	Left leg	Upper abdomen		Cannot walk
3 L. C.	9 yrs.	f.	4 yrs.	Legs	Right leg $\frac{5}{8}$ short	Right lower	Right dorsal, left lumbar	Walks well
4 F. A.	3 yrs.	m.	2 yrs., 6 mos.	Arms and legs	Both legs, right arm	Both sides	To left	Cannot stand or sit
5 T. H.	1 yr., 9 mos.	m.	1 yr., 6 mos.	Both legs, rt. arm		Right lower		Cannot walk
6 D. W.	2 yrs.	m.	1 yr., 3 mos.	2 legs, 1 hand	Both legs	Right side		Cannot walk
7 F. C.	3 yrs.	f.	3 yrs.	2 legs, right arm	Both legs	Upper, both sides		Cannot walk
8	21 yrs.	f.	19 yrs.	1 arm, 1 leg		Abdomen and back	Marked, to left	Cannot walk
9 G. S.	2 yrs.	m.				Abdomen, more in right	To left	
10 F. W.	3 yrs.	f.	3 yrs.	Legs weak	Partial, legs	Right abdomen, right chest	To right	Attack 1 week ago
11 N. E.	4 yrs., 6 mos.	m.	4 yrs., 3 mos.	2 arms, right leg	Right leg	Lower abdomen and back		Walks
12 M. E.	1 yr., 3 mos.	m.	11 mos.	Arms and legs		Right abdomen		Cannot walk
13 L. H.	3 yrs.	f.	2 yrs., 6 mos.	Legs and neck	Double foot drop	Left side, severe		
14 I. L.	1 yr., 7 mos.	f.	1 yr.	Arms, legs, neck	Right leg	Left side	To left	Cannot walk
15 J. D.	8 yrs.	m.	6 yrs.	Arms and legs	Legs and hands	Right side		Cannot walk
16 M. W.	21 yrs.	f.	13 yrs.	Legs	Both, partial	Abdomen, nearly total	No scoliosis	Walks short distance, pain back

others partially, and others not at all. This is easily understood from the recession of the edema in the cord and consequent relief of pressure on certain cells before they are destroyed. This improvement, in the majority of cases, takes place in the first six months, but in the large majority of cases a considerable permanent atrophy and palsy in one or more limbs is left.

Another marked characteristic of the period of recovery is the tendency to the acquisition of fixed deformities, partly from accommodation to habitual postures, whether the result of voluntary choice, of unbalanced muscular action, or the pull of gravity, or of a combination of these factors. If the feet drop habitually, a fixed equinus may result in a few weeks; if the child is seated all day, fixed thigh and knee flexion often result.

Habitual strain also frequently results in deformity, or increases it, as in lateral deformity of the foot, knock-knee, and hyperextension of the knee, following attempts to bear weight on the weakened and unsupported limb. The muscles which should guard the joint from strain being disabled, the strain falls upon the ligaments, which yield in the end to the continual forcing. Permanent thigh flexion is usually combined with abduction; knee flexion, often with knock-knee and outward rotation of the leg; and pes equinus is often, but not always, associated with knee hypertension.

The head of the humerus may fall away from the glenoid cavity from the continuous unsupported pull of gravity, and dislocation of the hip occasionally occurs from relaxation at that joint. In such cases the head of the femur can readily be slipped in and out of the socket, but cannot be retained in place without an operation to contract the capsule or to fix the joint.

Poliomyelitis is not known to be especially associated with other diseases, but often occurs accidentally with other affections, and some of the combinations may be puzzling. It is often seen in rachitic children, which, considering the frequency of rickets at the age most liable to poliomyelitis, is not strange. One should distinguish in these cases between essential palsy and the pseudo-paresis of rickets.

A girl had poliomyelitis at four; at ten she had an attack of chorea. The choreic movements were decidedly worse on the paralyzed side.

A baby was born with obstetric palsy of the right arm. At eight months she had a typical attack of poliomyelitis with paraly-

sis of both legs, the left recovering, and thereafter presented both forms of palsy.

A boy had an attack of poliomyelitis at one and a half, resulting in a cold, weak, and wasted left leg. He afterward developed tuberculosis of the lumbar spine. Without a careful history this combination might be puzzling.

Cases of scoliosis are occasionally seen where the history or a careful examination of the limbs discloses a previous attack of poliomyelitis. Fixed scoliosis does not result in these cases from inequality of the length of the legs alone, but is due to paralysis of the spinal or abdominal muscles.

The *diagnosis* is practically impossible until the paralysis is declared, except in epidemics. In fever of sudden onset in summer one should always test the muscular power of the limbs. Poliomyelitis has often been mistaken for cerebrospinal meningitis, typhoid fever, acute rheumatism, ptomaine poisoning and gastroenteritis. The flaccid motor palsy of sudden onset, without delirium or unconsciousness, distinguish it from all of these. Landray's paralysis and many polyneuritides are, undoubtedly, in many cases nothing more than poliomyelitis.

Prevention lies in the avoidance of infected districts during an epidemic, isolation of the sick, and the avoidance of overeating and sudden chilling in hot weather. A prophylactic serum may be discovered, but one would hesitate to give it to a healthy child, unless in an infected house; when the paralysis is declared it is too late.

The prognosis as regards life is usually good, though in severe epidemics there is a moderate mortality. Partial recovery of power in some of the recently paralyzed muscles may be looked for; full recovery in all rarely takes place. After one year, usually after six months, further spontaneous recovery of power cannot be expected, and if the child walks on a damaged limb without proper mechanical support the deformity and weakness are often aggravated. Children can always be put on their feet and made to walk, even years after the attack, if one limb has fair power, no matter how weak its mate. Even if both legs are practically helpless, locomotion with crutches and splints may often be accomplished.

The conventional treatment by massage and electricity is completely ineffectual. Improvement occurs only during the stage of spontaneous recovery. This was publicly acknowledged by Dr.

Bernard Sachs, of New York, a distinguished neurologist, and chairman of the Collective Investigation Committee of the New York epidemic of 1907, at the Congress of American Physicians and Surgeons in May, 1910, in these words:—

“I consider that time given to massage and electricity in these cases is time wasted; I cannot see that such methods do any definite good, and a great deal more benefit would be obtained by early institution of orthopedic measures.”

This has been the practically unanimous opinion of orthopedic surgeons for a generation.

The most important indication in the first four to six weeks of the disease is rest in bed, in order to avoid irritating the site of the lesion and that the antitoxic forces of the body may have an opportunity to limit or repel the infection. As we do not yet understand the nature of the virus or how to combat it, the treatment should be hygienic and symptomatic; the bowels should be regulated and the child made comfortable, kept well nourished and in the fresh air. Furthermore, as deformities, such as foot-drop, hip and knee flexion, and the like, may be acquired within a few weeks, these must be prevented by attention to posture and, when necessary, by moderate stretchings and splinting. Even if the child is disposed to stand or walk, he should not be allowed to do so until a careful examination shows that the active process is over, and that the limbs and joints are strong enough to stand the strain. If not, he should be kept quiet until proper supports are prepared. The prevention of strain and deformity, however, is not the only function of splints in these cases. There is nothing more damaging to a weak or palsied muscle than continuous elongation or stretching; on the other hand, if the paralyzed muscle is protected from traction and held in the shortened posture by proper splints, damage will be limited and a larger recovery of power; at least a better utilization of latent but previously unavailable force is often seen, and this may occur many years after the attack. Many of these cases, more or less lame and helpless, seek the practitioner months or years after the attack. Though full recovery can no longer be expected, the condition of these advanced cases can nearly always be much improved. The indications are to improve local circulation, nutrition, static and muscular balance, and to correct deformity. It is extremely important that an accurate physical survey of the child should be made—the nature, degree, and cause of his

disability defined, and measures devised for its mitigation. More of practical value can be learned from systematic testing of the voluntary power of the various muscle groups than from an electrical examination. Such tests are made by noting the patient's postures and movements, including locomotion, by asking him to execute the movements it is desired to test, and by noting the reaction to tickling the soles or to a light pin prick. Weakened muscle groups, faulty muscle balance, inequality in length of the lower limbs, and vasomotor power should be observed.

For the nutritive and circulatory inadequacy and retardation of growth, vibration—local, spinal and epiphyseal—is our most powerful remedy but one, namely, the normalized use of the part; that is, its use in proper relations and without undue strain.

When there are fixed deformities these must first be corrected, which, with the exception of scoliosis, may usually be done with simple tenotomies, myotomies, and fasciotomies, followed by proper retention apparatus, giving only needed support and imposing no unnecessary restriction.

The matter of overcoming deformities and equalizing muscle balance is usually of far greater importance than the questions of full joint action or of general muscular development. When the opponents to a certain muscle are practically dead, to cultivate the functioning muscle only increases distortion and aggravates the difficulty. What is needed is not more power, but a better balance and a better distribution of power, which may often be accomplished by voluntary movements of the weaker group, orthopedic and surgical treatment, or by such a simple measure as balancing the shoe, or by increasing the thickness of the sole of the shoe on the short side.

When the only effect of the contraction of an active muscle is to distort the part and to make useful function more difficult, it may be, and frequently is, the part of wisdom to lock up such a part by an operation or a brace, thereby vastly increasing symmetry and supporting power and sacrificing only deleterious action.

The points in the foregoing remarks to be emphasized are:—

(1) The not infrequent occurrence of poliomyelitis in adolescents and adults.

(2) The fairly frequent occurrence of abdominal palsy.

(3) The uselessness of massage and electricity.

(4) The value of rest in bed in the early stage, and of orthopedic and surgical treatment, both early and late.

(5) The necessity for a systematic statistical investigation by State Societies and Boards of Health.

DISCUSSION.

DR. COIT.—Is Dr. Alexander Marcy in the room? He requested to be permitted to offer a little discussion of this paper, as he had recently had a very interesting case of poliomyelitis in Riverton, in a child of two years, I think, that died before the diagnosis was made. He invited a Philadelphia pathologist to make the autopsy; and, from the macroscopic appearance of the cord, and, later, its microscopic appearance, the pathologist thought it wise to send the material to Dr. Simon Flexner at the Rockefeller Institute. Dr. Flexner inoculated monkeys with it, and in every case the animal developed poliomyelitis. There was no paralysis in this child, which makes the case very interesting. Dr. Marcy is not present, but I thought that I would relate the main facts in connection with his case. We will allow a few minutes for the discussion of this paper before proceeding to the next.

DR. JOSEPH FUNK.—I consider massage and electricity a great help in the treatment of these cases. I notice that the writer says that they are useless; but he recommends that the circulation of the limb be kept up. I do not know of any better way to do this than by massage and electricity. Locking the limbs up in braces tends to decrease the circulation rather than to increase it. Massage, persistently given, month after month and, if necessary, year after year, will do more than anything else than I know of. I heard related in New York a case in which a physician who had been practicing twenty years said that when he was an assistant to an orthopedist an infant was brought to the orthopedist on a pillow, and that this infant is now a young lady, and is practically well. She has hardly any trouble—only a very slight limp. She is practically normal, but she has had twenty years of treatment. Because a few months of such treatment will not cure a case, this does not say that years of massage and electricity will not help it. The neurologist who opposes that method of treatment does not persist long enough. We think nothing of treating tubercular disease of the limbs for a long time, and if we persist in the treatment of poliomyelitis year after year we, in a great many cases, are well repaid for our efforts.

DR. DAVID T. BOWEN.—I recognize the fact that many men

claim that massage and electricity have little or no use. It is like a great many of our efforts. Poliomyelitis is a self-limited disease, and no matter what form of treatment we might endorse the question would arise, How much of the improvement was due to the treatment, and how much to nature? It is difficult to decide this question. I had under my care a girl who had been paralyzed seven years as the result of poliomyelitis. She had a 'flail-foot. The quadriceps tendon was apparently paralyzed, so I instituted treatment. I put on a leg support, and gave electricity and massage. We got perfect power, and were able to cut the brace down. The fact that she had been paralyzed seven years led me to attribute the result to massage and electricity.

DR. TAYLOR (closing).—The discussion is, of course, what one would expect when one opposes conventional treatment; but my opinion is not the result of hasty generalization, but of twenty-five or more years' experience with poliomyelitis. I quite agree with the statement that the cases need a long period of treatment, and patients that are helpless, even years after the attack, may be very much benefited. There are some men in New York who have added greatly to their practice by a strong advocacy of electricity and massage. At the end of one, two or three years these patients leave these physicians with acquired deformity that could easily have been prevented. We straighten out these deformities, and apply splints; and the patients usually walk as soon as they get the splints.

RECTAL GONORRHEA IN CHILDHOOD.—Kaumheimer (*Munch. med. Woch.*, May 3, 1910) calls attention to the not infrequent occurrence of a gonorrheal infection of the rectum associated with a specific vulvovaginitis of childhood. He believes the contagion is by direct infection from the vaginal discharge. The subjective symptoms are usually very slight and in the majority of the cases are absent entirely, the disease being found only by systematic search. The occurrence of these rectal infections without symptoms may be an explanation of the difficulty in curing and the tendency to relapse in many cases of gonorrheal vulvovaginitis in infants. It may also play an important part in the spreading of epidemics in children's hospitals. On the theory that the infection may be spread by the use of the rectal thermometer, the author advises that in cases of gonorrheal vulvovaginitis the taking of rectal temperature be stopped.—*Medical Record.*

ON ACUTE PERICARDITIS IN CHILDREN.*

BY DAVID BOVAIRD, JR., M.D.,
New York.

Acute inflammation of the pericardium, while not a frequent lesion in childhood, is not uncommon. The subjoined charts illustrate this statement in effective form. The first is drawn from 1,000 autopsies made at the New York Foundling Hospital in about eight and one-half years. It shows 14 cases of acute inflammation of the pericardium occurring at ages varying from six months to three years. The second comprises the cases of acute pericarditis in children observed in the wards of the Presbyterian Hospital during the past four years in a total of about 10,000 patients. The service is, of course, largely composed of adults, but the patients under sixteen years of age number perhaps one-tenth of the total. These tables may be taken to demonstrate that acute pericarditis is not uncommon even in childhood, that it is rarely indeed the primary disease—and that, as we all know, it is a serious affection, and often proves the final catastrophe in severe illness.

Pathology. The pathology of acute pericarditis is so well known that only points of special interest will be mentioned.

The conventional manner of describing several types of pericarditis and denominating them—dry, serous or purulent, or fibrinous pericarditis and pericarditis with effusion—is misleading. Acute pericarditis, we may say, is always marked by swelling of the pericardium and an effusion upon its surface or into the sac. This effusion consists of fibrin, serum and leukocytes in varying proportion. If the serum is scanty and the fibrin abundant, there is little or no fluid in the sac, and the pericardium is coated with a plastic exudate, we speak of the pericarditis as dry or fibrinous. If the serum is more abundant, so that it distends the pericardium, the process is denominated pericarditis with effusion or sero-fibrinous pericarditis. And if the polynuclear leukocytes in the fluid become abundant and undergo degeneration, we speak of a purulent pericarditis.

* Read before the Twenty-second Annual Meeting of the American Pediatric Society, Washington, May 5, 1910.

For a clear understanding of these conditions it seems very desirable to emphasize the well-established fact that these several varieties of pericarditis are but steps in the process of reaction of the pericardium to the assaults of certain noxae, toxins or bacteria. The dry pericarditis of one day may be a pericarditis with effusion the next, and the effusion may eventually prove to be either serous or purulent.

Certain characters of the exudate in acute pericarditis are of practical importance. The amount of fibrin in the exudate varies greatly. In many cases there is sufficient only to coat the pericardium and give it a slightly granular or rough appearance. In other cases the fibrin is so abundant as to cover the heart with a thick plastic layer which may be as much as a centimeter in thickness. The pericardium may therefore be considerably distended and the total width of the area of cardiac dullness greatly increased without the presence of fluid in the sac, and an exploring needle, though it enter the sac, may fail to obtain fluid. In certain cases where pus is present, it may, for like reasons, be obtainable only by an exploring needle of large caliber. The close resemblance in this regard between effusions of the pleura and pericardium in children is very striking.

It is not uncommon in severe cases to observe minute hemorrhage into the pericardium itself, and hemorrhagic exudates are frequently seen. Von Starck* records 4 cases of bloody effusion in rheumatic cases, and our own experience would lead us to believe that the presence of blood is not infrequent in non-tubercular conditions. Chylous effusions are practically unknown in childhood.

The disposition of the effusion with relation to the heart itself is of importance. The conception that the fluid in pericarditis is evenly distributed about the heart is certainly not correct. The fluid tends to accumulate in the lowermost parts of the sac, that is, with the patient supine, in the lower or posterior part. The anterior surface of the heart may therefore be but scantily covered when a considerable quantity of fluid lies behind the heart.

For this reason the effect of the effusion is to distend the pericardial sac downward and backward and there is little or none at all of the assumed floating of the heart itself upward.

It is also clear that the fluid in pericarditis does not quickly or readily change its distribution, and one fails to observe very

* Von Starck, *Jahrbuch für Kinderheilkunde*, 1895, Vol. XL, pp. 70-77.

prompt response in physical signs to changes of position, such as are possible under the usual conditions. When, however, it is feasible to put the patient in the knee-chest position, an increase in the area of cardiac dullness, not previously observed, may be obtained.

In many cases of pericarditis the myocardium as well is involved and inflammatory or degenerative changes may be demonstrated in it. Beyond doubt the consequent weakening of the cardiac muscle plays a part in causing circulatory failure, and in many cases relaxation of the cardiac chambers is one element in the enlarged area of cardiac dullness.

Associated Lesions. The table of observations from the Foundling Hospital is of interest, showing, as it does, that in every instance but one the recorded pericarditis was accompanied by pneumonia, or pleurisy, or both. The one exception (enterocolitis) is sufficient, however, to support the clinical experience that such association is not inevitable. It is also notable that in these cases the pericardial effusion in 11 out of 14 cases was purulent, and in the remaining 3 sero-fibrinous. In fatal cases we expect the severer lesion, but the frequency of suppurative pericarditis is important.

In early childhood the type of pneumonia seems to be of little importance, lobar and bronchopneumonia both being found together with pericarditis.

The pleural inflammation may be of any grade, fibrinous, serous, or purulent, and it is well known that the two membranes being anatomically of like structure react similarly to any infection and the conditions found in pleura and pericardium in any one case are regularly the same.

Relation to Tuberculosis. In view of the common teaching of the frequency of tuberculous pericarditis, the absence of tuberculosis from the list of conditions associated with or accompanied by pericarditis may excite surprise, but so far as the writer's knowledge goes, the facts are properly stated. In 125 cases of tuberculosis in children under the age of seven years, examined in the postmortem room of the New York Foundling Hospital, tubercles were found in the pericardium of 4 cases, and in the heart muscle in 1, but in none of these cases was there effusion or any other evidence of acute pericarditis.

Clinical experience also corroborates these postmortem findings, for I cannot now recall ever having known a case of peri-

carditis in a patient under sixteen years of age to be proven by reliable evidence to be tuberculous. It is not, of course, meant to deny the possibility that tuberculosis may produce pericarditis in children, as it is well known to do in adults, but simply to indicate that the tubercle bacillus is very rarely indeed found in this relation.

Bacteriology. Unfortunately in the Foundling Hospital cases no cultures were made, but studies made in the Presbyterian Hospital show that in the pericardial exudates (especially the suppurative) the pneumococcus is most often found, as the frequent association of pneumonia and pleurisy would lead one to expect. Staphylococci or streptococci are occasionally found, but other bacteria (gonococcus, etc.) are very rarely met with.

Bacteria are, of course, most frequently found in purulent exudates. They may, however, be demonstrated in serous or fibrinous effusions. The frequency with which the serous exudates are sterile is noteworthy. Also it must be remembered that the evidence is altogether that these sterile exudates are not tuberculous, but belong for the most part in the rheumatic class.

Poynton and Payne have obtained their "streptococcus rheumaticus" from the pericardial exudate in cases of rheumatic fever, but this we have never been able to do.

Symptomatology. Of the symptoms of acute pericarditis but little will be said, since they are of relatively small importance to the diagnosis.

Dry pericarditis gives rise to very little disturbance, and its onset is marked by the symptoms of the primary condition. There may be discomfort or pain, although in many cases the friction of the inflamed surfaces seems to be scarcely appreciated, and some moderate increase in the pulse or temperature.

With an increasing effusion dyspnea, or orthopnea, cyanosis, and rapid, irregular and intermittent action of the heart develop.

The temperature varies with the nature of the effusion, and may be low or high. In the septic cases there are high fever, pallor of the skin with cyanosis, and frequently profuse sweating. As in nearly all cases the pericarditis is accompanied by acute inflammations of other parts, the heart, the pleura, the lungs, etc., it is quite impossible to satisfactorily determine the relationship of lesions and symptoms.

While in most cases acute pericarditis is a rapid process, quickly evolving its symptoms and physical signs and rapidly pro-

ducing a crisis in the patient's condition, it is well known that in some instances the onset is insidious. Coutts* has reported a case in which a four-year-old child had been sick for ten weeks before being brought to the hospital, and lived seven weeks longer, with a purulent effusion in the pericardium, which he regarded as primary. During this long period there was nothing in the clinical picture to direct special attention to the pericardium.

Physical Signs. These are the rational signs, first, of a roughening of the serous covering of the heart and then of its distention by accumulating fluid. In dry pericarditis we have the characteristic to and fro rub. When an effusion collects we have the bulging precordium, an increased area of cardiac dullness, enfeebled or lost apex beat and auscultatory sounds, and finally dullness in the cardiohepatic angle, as was years ago demonstrated by Rotch.

Taking the physical signs in conjunction with symptoms of serious illness it would appear that the diagnosis of acute pericarditis in childhood should be readily made. Yet every one knows that the contrary is the fact and that there is no other grave malady so frequently discovered for the first time in the postmortem room.

For the explanation of this situation there are several facts of importance. First of all, that acute pericarditis is a secondary affection, and secondary to some serious primary disease, such as a septic infection, pneumonia, acute rheumatic fever, and the like. The severe symptoms of the primary affection mask the onset of the inflammation of the pericardium. The patient's condition changes for the worse, but the change can readily be explained as the augmentation of the symptoms of the primary disease.

Secondly, the physical signs may be notably modified or obscured by attendant conditions. The pericardial friction sound is justly regarded as a most significant sign of acute pericarditis. Its presence most often first calls attention to the fact that the pericardium is involved and leads to more careful observation. Yet it must be admitted that acute pericarditis can develop and go on to effusion without its being possible, even by the most careful and repeated observation, to detect the characteristic rub. During the last year we had under our care in the Presbyterian Hospital a boy of ten years, whose primary disease was pneumonia, complicated later by a left-sided empyema. The pleura was opened

* Coutts, *British Medical Journal*, 1903, Vol. II., p. 359.

and drained, and yet the patient did not improve. Day after day most careful study of the heart was made both by myself and an alert house staff. No friction sound was heard at any time, and yet at autopsy a heavy layer of fibrinous deposit was found covering the pericardium. This thick, plastic type of exudate, covering, as it does, the surface of the heart evenly, gives neither the characteristic friction rub nor those of fluid, and is most often overlooked in consequence.

The conditions in the patient to whom reference has just been made well illustrate the second great difficulty, as regards the physical signs of pericarditis, namely, that they are often obscured by the attendant conditions.

It was observed for some days that the limit of cardiac dullness on the right of the sternum was displaced distinctly to the right. This was at first assumed to be due to the empyema, and when it persisted after the opening of the pleura we failed to attribute due importance to it. The presence of the empyema on the left side naturally obscured the limits of cardiac dullness in that direction and left us only the apparent displacement of the cardiac dullness to the right to interpret.

In a similar manner a pleural effusion on the right, a pneumonia, an enlargement of the liver, a marked abdominal distention displacing the liver and diaphragm upwards, or still more commonly the noisy respiration or restlessness of an extremely sick child make observation difficult or misleading.

Recognizing that in this situation any aid to diagnosis will be welcome, I venture to direct attention to a new method of studying old signs with relation to the diagnosis of pericarditis with effusion or serum or pus, the conditions of most vital importance, a method learned from following the careful clinical studies of Dr. Francis P. Kinnicutt.

Increase in the area of absolute cardiac dullness has long been known as one of the most important signs of these conditions. Also that the increased area of dullness had a characteristic form, that of a truncated triangle, the broad base below, the truncated apex above.

The point which the experience of recent years has impressed upon us as of peculiar value is that careful observation will demonstrate, in any case of pericardial effusion large enough to be of consequence, a *progressive* increase in this area, and that such

progressive increase constitutes the most reliable evidence of a pericardial effusion. (See illustration.)

The detection of progressive increase in the area of cardiac dullness implies the repeated careful examination of the heart and



FIG. 1.—Acute Pericarditis, showing the area of cardiac dullness at its maximum. The symmetry of distention is striking. This has been observed in other cases.

the recording of results in some more or less permanent form for later comparison. The outline of cardiac dullness may be plotted on the chest wall, measurements from the mid-line recorded and the findings from day to day compared. But it is immensely more effective if the outline of cardiac dullness can be marked upon the chest wall in some form that will show the changes from day to day. We have done much experimenting in search of a suitable method. The outline may be marked in ordinary ink and renewed from time to time as necessary, but we find that such marks are readily smudged or removed entirely by the nurse's ministrations. Nitrate of silver may be employed, but is so difficult to handle and so likely to cause excoriation, if used too freely, that it has not been found satisfactory. Lately some experiments

with the ordinary forms of indelible inks have shown that marks made upon the skin with them are more lasting and satisfactory than those made by any other method we have thus far been able to devise.

If, in every case of pneumonia, pleurisy, acute rheumatism and the like in which pericarditis may develop, by some such means the apex beat of the heart and the outlines of the cardiac dullness are marked clearly on the thoracic wall, we shall much more quickly than otherwise note any shifting of the apex beat or its disappearance and any subsequent changes in the area of cardiac dullness. The guiding marks are before our eyes. Furthermore, we shall have much more confidence in them than in measurements recorded in the history, which may easily be wrongly made or wrongly recorded.



FIG. 2—The same patient, showing outlines of cardiac dullness at successive stages of resorption fusing below into area of liver dullness. The outlines shown correspond closely to those observed during the accumulation of the fluid.

With such guides the limits of cardiac dullness may be found to shift in the course of a few hours to a very appreciable extent. It

is, of course, not the shifting of the limit of dullness on the right or left that is significant, for either alone may be produced by displacement of the heart. It is the outward displacement of dullness on both sides that marks and measures the increasing effusion. Incidentally in following this broadening of the area of dullness we shall appreciate all the more forcibly the dullness in the cardiohepatic angle, and the fact that while the cardiac dullness is increased in all directions the greatest increase is along the base line, *i.e.*, on the diaphragm.

Dilatation of the heart, it may be objected, may give rise to exactly similar enlargement. Granted, theoretically; but practically the objection carries little weight. Dilatation also is an enlargement of either right or left ventricle, rarely indeed simultaneously of both, and therefore has not the symmetrical form of pericardial effusion. In our experience dilatation, unless caused by pericarditis, never occurs in the progressive manner characteristic of the pericardial effusion. Furthermore, the chance of error is removed by observing that the increasing dullness is most marked along the diaphragm and especially in the cardiohepatic angle.

In doubtful cases where the diagnosis is of the utmost importance, it has been found that the area of cardiac dullness in the course of twelve or twenty-four hours will show changes which are decisive. Observation over night or for a day will therefore satisfy one of the presence or absence of pericardial effusion and also give exact important evidence with relation to the question of treatment.

Broadbent and Poynton* both state that such gradual increase in the area of cardiac dullness, associated with dullness in the cardiohepatic angle, may be due to increasing cardiac dilatation, but this the writer has never observed save in the cardiac dilatation resulting from acute pericarditis and accompanied by pericardial effusion.

It should, of course, be understood that the emphasis put upon this particular sign of pericardial effusion is not meant to deny the value of other signs, especially the pericardial friction and the progressive weakening of the apex beat and the heart sounds.

The disappearance of a previously heard pericardial friction may be expected with an increasing effusion, but does not always

* Broadbent, "Heart Disease," fifth edition, 1906, p. 34.

Poynton, "Heart Disease and Thoracic Aneurism," 1907, p. 170.

follow. Owing to the tendency of the fluid to gravitate to the lowermost part of the pericardium, the upper part may still remain in contact, and the pericardial friction persist even with large effusions. Just where the friction will be heard under these circumstances will depend upon the posture of the patient and the disposition of the fluid.

Signs Over the Left Lower Lobe.—As a collateral sign of pericardial effusion Pins, of Vienna, long ago pointed out evidences of pressure exerted upon the left lower lobe of the lungs and these signs have been repeatedly studied by other observers. Ewart* outlines the area of dullness produced in this manner as bounded by a line drawn outward from the vertebral column at the level of the ninth and tenth ribs and a perpendicular line dropped from the vertebral border of the scapula. Below the dull area reaches the base of the chest and internally is bounded by the vertebral column or it may pass slightly to the right of it. Over the dull area the voice and breath sounds are diminished or absent.

Without doubt in most cases of large pericardial effusion one finds dullness with some modification of the voice and breath sounds, either intensification or diminution, below and internal to the angle of the scapula. Rarely, however, are the signs delimited with the exactness laid down by Ewart's boundaries. The interpretation of these signs is not easy. A partial consolidation of the lung, a pleural effusion, or compression of the lung by the distended pericardium may account for them. The arguments by which Fetterolf and Landis* explain the hydrothorax of cardiac dilatation by pressure upon the pulmonary veins are of interest in this relation. The distended pericardium undoubtedly exerts pressure upon the left bronchus and the lower pulmonary veins, and partially compresses the surrounding lung. But the surrounding lung comprises the upper lobe and the upper part (apex) of the lower lobe, and not the part of the lung corresponding to the area of dullness marked out by Ewart. In brief the compression affects the apex of the lower lobe, while the physical signs are at the base.

Furthermore, we have all, I am sure, followed the gradual evolution of these basal signs of pericardial effusion from day to day, till we have become satisfied of the presence of an effusion in the left pleura, and aspirating it have obtained more or less

* Ewart, see Poynton's work, p. 171.

† Fetterolf and Landis, *Am. Jour. Med. Sc.*, 1909, Vol. CXXXVIII., p. 712.

fluid. To determine the presence or absence of fluid in the left pleura under these conditions, *i.e.*, with a distended pericardium and the physical signs mentioned at the left base, is most difficult. The extent of the dullness and the diminished voice and breath sounds is probably of most importance. In any case with extensive dullness exploratory puncture of the pleura is called for, in the hope that fluid may be formed and partial relief obtained by its withdrawal.

The studies of Fetterolf and Landis, above spoken of, explain the hydrothorax accompanying cardiac dilatation by the pressure of the enlarged heart upon the pulmonary veins, with consequent stasis in, and serous effusion from, the pulmonary pleura. The same explanation may apply to the physical signs and serous effusion so regularly found at the left base in cases of pericardial distention by fluids.

Neither in the discussion of the physical signs or pericarditis with effusion, nor with reference to the signs at the left base, has mention been made of the information to be had by changes in the position of the patient. It has been claimed that by turning the patient from side to side, or moving him from the recumbent position to the upright, or even from the recumbent attitude to the knee-chest position, valuable information may be obtained with reference to the physical signs and their interpretation. In the great majority of the cases of pericardial effusion, however, the patient is too sick and too uncomfortable to permit of much movement, and efforts to make such comparisons have, in our experience, been of little or no value.

The subject of the diagnosis of pericardial effusion cannot be dismissed without reference to the use of the X-ray. The possibilities of this agency in the diagnosis and study of cardiac lesions in the adult have been fully demonstrated by the remarkable work of Groedel and others. Because of the greater penetrability of the thorax children offer still better opportunities for such study than adults, and yet thus far but little work has been done in this field. Particularly with relation to pericardial effusion in children, it appears that the X-ray may offer invaluable information, displaying as it does not only the limits of the distended pericardial sac, but the position of the heart in the sac itself, so that if aspiration is contemplated the site of puncture may be chosen in confidence that the heart will not be touched.

These possibilities, which to most of us have been a dream,

have been translated into fact by the pioneer work of Rotch, but a few weeks ago presented to us in his new and most interesting volume, the "Roentgen Ray in Pediatric Practice." In that work are three beautiful plates illustrating the points just stated. The difficulty of obtaining radiographs of severely sick patients has prevented the general use of them in cases of pericarditis, but if such invaluable information can be obtained by this means the difficulties must be overcome, especially as Rotch has apparently demonstrated that they can be.

Aspiration of the Pericardium.—Withdrawal of fluid from the pericardium by a syringe or the aspirator may be undertaken either for diagnostic or therapeutic purposes. Serious objection has of recent years been made to the procedure as so dangerous as to be unjustifiable, and it has been urged that if the pericardium is to be entered it should be done by incision under cocaine, so that the operator may see clearly what he is doing. The strength of this position is not to be denied. Attempts to aspirate the pericardium have too often proved aspirations of the heart, and death has more than once resulted from the procedure. Various writers speak of having penetrated the heart and drawn blood from it without harm. In the physiologic laboratory blood is drawn from the calf's heart with a canula several times the caliber of an aspirating needle and the canula withdrawn without harm. On two occasions, however, I have seen the heart of an adult punctured and hemorrhage into the pericardium caused with fatal consequences. As it happened, both patients would undoubtedly have died in any event, but the gravity of puncturing the pericardium with an aspirating needle has been deeply impressed upon me. And yet to wholly disregard the procedure because of this danger seems unwise. If exploration of the pericardium is to be undertaken only as an open surgical operation, a limitation will be put upon its use which in the end will work more harm than the older procedure. Moreover, it is possible by adequate care in our observations to make practically certain the diagnosis of pericardial effusion and to practice aspiration with safety. This is especially true in childhood for reasons already pointed out, and in the many aspirations of the pericardium in children which I have seen or done no serious mishap has occurred. Finally, if the Roentgen rays can be employed and such plates as Rotch's obtained, aspiration of the pericardium can be rendered entirely safe.

Scope of Paracentesis.—A wholesome fear of the use of the aspirating needle in the pericardium has undoubtedly limited its employment. Exploratory puncture must be employed more freely if we are to recognize and treat properly (by drainage) the suppurative conditions which are not uncommon. The nature of the antecedent infection, rheumatic fever, pneumonia, septicemia, cannot be relied upon to determine the nature of the effusions. Suppurative pericarditis has developed in rheumatic conditions and serous effusions been found in pneumonia and septicemia.* Since suppuration demands drainage, safety can be had only by knowing the character of the fluid present in the pericardium, unless we are ready to say that all effusions in the pericardium should be drained.

Secondly, paracentesis may be required for therapeutic purposes. There is a general tendency to rely upon natural processes for the absorption of serous effusions, particularly in rheumatic cases. English writers agree that aspiration in these cases is rarely required, and Poynton says that he has never seen a case of rheumatic pericarditis require such intervention. That view must be extreme. Certainly one sees fatal cases of rheumatic fever in which pericardial effusion is one element in the untoward outcome, and also from time to time one sees rheumatic patients suffering from endo- and pericarditis, and apparently in extremis relieved and helped toward recovery by removal of fluid from the pericardium.

Site of Aspiration.—The fourth or fifth interspace close to the sternum was first selected for this purpose on the theory that the heart was floated upward by the pericardial effusion. Rotch demonstrated the falsity of this conception, and on the basis of his studies recommended reaching the pericardium through the fifth right interspace. Of recent years a point outside the apex and yet within the area of dullness of the distended pericardium has been advocated by West and others. To either of these sites the objection may be urged that to reach the pericardium the overlying pleura (left or right as the case may be) must be penetrated. The great point in favor of one or the other is that they undoubtedly offer less chance of injuring the heart. This fact, supported by theoretical considerations and practical experience, is demonstrated beyond doubt by the radiographs already spoken of. With any considerable effusion into the pericardium there is

* Poynton, "Heart Disease and Thoracic Aneurism," p. 168.

space on either side of the lower or diaphragmatic border of the heart between the two layers of pericardium occupied only by the effused fluid. Puncture in either of these spaces, so long as it is made in a plane parallel to the median plane of the body, *i.e.*, with the needle parallel to that plane, ought to be entirely safe. Danger arises whenever the needle is given an oblique direction, and the operator is left to try to calculate the position of the point from the line of direction and the length of the needle. Owing to the fact that the distended pericardium is practically always outside the nipple line on the left, puncture outside the apex must be made on the shelving side of the thorax, and it is extremely difficult to avoid a definite inward inclination of the needle with resulting danger of transfixing the apex or the right ventricle of the heart. Furthermore, if the heart is pierced under these conditions the active motion of the affected part (the most active of any part of the heart) tends to enlarge the puncture into a linear wound which is sure to bleed. The two serious results which I have seen in adults were to be explained on these grounds. On the other hand, West* objects to the fifth right space as the most dangerous of all, because of the neighborhood of the thin-walled right auricle. I have safely used both sites, in one instance obtaining the fluid by puncture outside the apex after having failed in the fifth right space, but for the reasons given I have a distinct preference for the latter site.

Prognosis.—The outcome in any case of acute pericarditis in childhood depends, for the most part, (1) upon the primary disease, (2) upon the amount of effusion, and (3) upon the character of the effusion, whether serous or purulent.

The primary disease and the character of the effusion are usually closely connected. In rheumatic infection the effusion is regularly fibrinous or serous. In septicemia, pneumonia, pleurisy and the like it is most often purulent, but may be serous or sero-fibrinous.

The pure fibrinous or serous exudates regularly resolve with the formation of adhesions. In the rheumatic cases there is a notable tendency to recurrence of the inflammation of the heart and the pericardium, with an ultimate development of chronic endocarditis and chronic adhesive pericarditis. In hospital practice children suffering from these conditions regularly return year after year, and sooner or later surely succumb to cardiac

* West, *London Med. Jour.*, 1908, Vol. XIII., p. 21.

failure. In private practice results are better, but even under the best conditions it is difficult to prevent recurrences, and the prognosis, so far as concerns active, healthful life, is gloomy.

Suppurative pericarditis in children is fatal in nearly all instances, yet recoveries under appropriate surgical treatment have been recorded. In Eliot's* tabulation of 22 cases of suppurative pericarditis treated by operation, one of the patients was sixteen years of age, and 7 under that age. Of these 1 recovered. This patient was a girl, five years old, who, after a tonsillectomy, developed a left-sided empyema and later suppurative pericarditis. The pleura was first opened and later the pericardium was drained through the empyemic cavity. The child made a prompt recovery. In several of the other cases distinct improvement followed the draining of the pericardium, but the patient died of some further extension of the infection.

The following case illustrative of several of the points made in this paper may here be cited.

J. H., a boy of ten years, was taken sick March 14, 1909, and on admission to the Presbyterian Hospital five days later (the 19th) was found to have a lobar-pneumonia of the left lower lobe. He had the usual high fever, rapid pulse and respiration of that condition. Two days later, in the evening, the patient became very restless and tossed about his bed continually. Examination of the cardiac area showed an extension of the cardiac dullness on both right and left borders of the heart, and a friction sound was heard in the cardiohepatic angle and along the left border. The pulse had risen from 144 to 160, but there was no notable change in the temperature or respiration. The heart sounds were distinct. Twelve hours later (the next morning) the limits of cardiac dullness were further displaced outward, especially on the right, where the line of dullness was outside and above the right nipple, and the cardiohepatic angle was broadly obtuse. The heart sounds were fainter. The friction sounds could still be heard over the upper part of the cardiac area. An aspirating needle inserted in the fifth right space about one inch from the sternal margin withdrew pus. The same morning Dr. Eliot resected a portion of the fifth left costal cartilage, opened the pericardium and inserted a drainage tube. Although little pus was discharged at the time of operation, an abundant discharge occurred shortly afterward. In every way the child's con-

* Eliot, *Annals of Surgery*, 1909, p. 61.

dition improved for several days, when the right pleura was found to contain pus and was in turn opened and drained. Even under those conditions the child rallied and improved for a time, but died on April 4th, thirteen days after the opening of the pericardium. The pneumococcus was found in both pericardial and pleural exudates.

The apparent hopelessness of these cases should urge us to more careful observation and study, that by early diagnosis adequate treatment may be undertaken as promptly as possible, and the great danger of death, if possible, averted.

The quantity of the exudate, be it serum or pus, has a definite relation to the prognosis. The studies of Haven Emerson* on the effects upon the circulation of fluid (water) injected into the pericardia of dogs have apparently proven that the weak and irregular heart action and falling blood pressure produced by increasing pressure in the pericardial sac is due not so much to the direct effects of the pressure upon the heart itself as to the mechanical cutting off of the return of blood to the heart by pinching or compressing the superior and inferior cava within the pericardium. By reason of this obstruction blood enters the heart with difficulty, the chambers are improperly filled, and the heart exhausts itself in a vain effort to maintain the falling blood pressure.

These studies indicate that whatever the nature of the pericardial effusion, if it be accompanied by low blood pressure and weak, irregular heart action, the pressure within the pericardial sac should be lowered, either by aspiration or drainage.

Treatment.—Rest in bed, careful feeding and nursing are, of course, the essentials. The primary disease must be treated. It is doubtful whether even in the rheumatic cases our remedies have direct influence upon the pericardial inflammation, but the free administration of salicylates has often seemed to check the process. Opium or morphin is of service for the relief of pain and distress. Children, as a rule, object to the application of cold, and the ice-cap seems to have but little effect.

The question of greatest importance is the amount and character of the fluid present. We can estimate the amount from the physical signs and the evidence of interference with the heart action. The character may in many cases be inferred from the

* Personal communication

nature of the primary process, but not with surety. With any large effusion it is, therefore, safest to ascertain the character by an exploratory puncture.

Rheumatic effusion will, as a rule, resolve naturally, but certainly removal of the fluid relieves distress and hastens recovery, just as it does in the case of the pleura. With large effusions, aspiration is therefore desirable, and if the conditions are thoroughly studied can be safely done. The removal of even a few ounces of fluid brings definite relief and, in my judgment, earlier recovery.

If the effusion is purulent open drainage is required. For this purpose a portion of the fifth, sixth or even seventh costal cartilage on the left side may be removed, and the drainage tube inserted. Even with such treatment the chance of recovery is small. It will be increased only when we learn to control the primary infections or to make the diagnosis earlier and more promptly institute proper treatment.

TABLE I.

CASES OF ACUTE PERICARDITIS FROM THE AUTOPSY-RECORDS OF
THE NEW YORK FOUNDLING HOSPITAL.

No.	Sex	Age	Associated Lesions	Type of Pericarditis
1	Male	9½ mos.	Pleurisy, serofibrinous, and infarctions of lungs	Serofibrinous
2	Male	2½ yrs.	Pleurisy, fibrinopurulent, and lobar pneumonia	" "
3	Male	3¾ yrs.	Empyema	Purulent. Pus, 8 ounces
4	Female	6 mos.	Empyema and bronchopneumonia	"
5	Male	1¾ yrs.	" " " "	"
6	Male	9 mos.	Diphtheria and lobar pneumonia	"
7	Male	1 yr.	Empyema	"
8	Male	2 yrs., 7 mos.	Empyema and lobar pneumonia	"
9	Male	7 mos.	Acute enterocolitis	"
10	Male	9 mos.	Bronchopneumonia	"
11	Female	3 yrs.	Diphtheria, Bronchopneumonia, Empyema	"
12	Male	11 mos.	Bronchopneumonia, fibrinous pleurisy	"
13	Male	6 mos.	" " " "	Serofibrinous
14	Female	10 mos.	" " seropurulent "	Purulent

TABLE II.

ACUTE PERICARDITIS.—CLINICAL RECORDS OF THE PRESBYTERIAN HOSPITAL, 1906-1910.

No.	Sex	Age	Associated Diseases	Type of Pericarditis	Out come
1	Male	12 yrs.	Chronic Endocarditis	Serofibrinous. Adh. Peri'dium	D.
2	Male	15 "	Septicemia Empyema	Purulent	R.
3	Female	3½ "	Rheumatic Fever. Endocarditis	Fibrinous.	D.
4	Female	8 "	" " "	"	R.
5	Male	16 "	Lobar Pn.	Serofibrinous	R.
6	Male	13 "	Rheumatic Fever. Endocarditis	" Adh. Peri'dium	R.
7	Male	10 "	" " "	" " "	R.
8	Male	16 "	Endocarditis Chr.	Fibrinous	R.
9	Male	7 "	" "	Serofibrinous " "	R.
10	Female	10 "	" "	Fibrinous " "	R.
11	Male	8 "	" "	Serofibrinous	R.
12	Female	10 "	" " Lobar Pn.	" "	R.
13	Female	4 "	" "	Fibrinous	R.
14	Male	10 "	" "	"	D.
15	Male	7 "	Lobar Pneumonia	Suppuration	D.
16	Male	11 "	" " Empyema	"	D.
17	Male	14 "	" " Pleurisy Fibrinous	Fibrinous	D.
18	Female	7½ "	Lobar pneumonia, Pleurisy Fibrinous	Serofibrinous	D.

OXYGEN IN WHOOPING-COUGH.—Weill and Mouriquand (*Lyon Méd.*, August 22, 1909) find that the administration of oxygen at the commencement of the paroxysms in whooping-cough is of service in warding off bronchopneumonia and suffocation. The oxygen is given at each paroxysm, and, if possible, just as it begins. The cyanosis subsides and the patient is relieved. The gas renders the lung aseptic and thus able to resist infection. It must be used freely, at least ten or twelve liters for every paroxysm, and if there is danger of bronchopneumonia it should be inhaled every hour.—*British Journal of Children's Diseases.*

A CASE OF PSYCHASTHENIA IN A CHILD AGED TWO YEARS, DUE TO COFFEE DRINKING.

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The word psychasthenia may be extended to include all asthenic psychoses, or it may be limited to the group of what Regis¹ has called "Les Infirmités Psychiques," or "Psychopathies-Infirmités of Evolution," which will, of course, include hysteria, although he himself does not so include it, believing it to be due to a physical state of the nervous system.

This point need not be enlarged upon; for I use the word psychasthenia here, following Janet,² in the sense of an autonomous condition characterized by a mental uneasiness shown by acts, words or appearances indicating disquiet, and due to feelings of incompleteness, in an individual whose intelligence and emotions are otherwise intact. So long as the feeling of incompleteness lasts, the reactions it causes remain; and hence the symptoms are often long-continuous, and obsess the patient.

The case which follows illustrates the genesis of the disorder and the physical conditions which contribute to the state which Janet has called "lowering of the mental level."³ The treatment illustrates the need of attacking the cause of lowered tension rather than its consequences, whether these are tics, disordered emotions or mental propessions. In other words, "*Les obsessions ne durent plus quand elles n'ont plus de raison d'être pour exprimer un état général.*"

The case is striking for three reasons: Firstly, the easy discernability of the cause; secondly, because the cause is a physical one, viz., an intoxicant (such cases, however, have been described before);⁴ and, thirdly, because of the age of the patient; for I believe that this is the first time that symptoms of this character have been referred to psychasthenia in so young an individual.

THE CASE. Girl, aged two. Nursed at the breast until two months old, fed on condensed milk until six months old, fed on cow's milk and water until eighteen months old, then allowed to take any food she wished.

Since the age of three months her mother has given her coffee

at the same strength as taken by the family, and she now drinks three large cups a day; the rest of her diet consists of one-third of a glass of prepared cereal in the morning, and during the day she nibbles about one slice of bread and butter and eats a small piece of potato at midday for dinner. She will eat neither egg, fish nor meat, and she refuses vegetables and fruit.

She, however, since the age of six months, has been fond of eating plaster and earth.

Two months before she was seen she had begun to scratch her wrist during a great part of the day and had produced a deep raw sore there, which still persists.

For several weeks she has screamed all day long, and seemed in great distress. During the night she wakes suddenly and jumps up, and her sleep is restless and disturbed.

On examination, the fontanelles were found open, there was a slight rosary and the radial epiphyses were enlarged. The nutrition was poor, the deep reflexes were exaggerated, the tint was sallow, the intelligence was not accessible at the examination. In spite of her apparent excitement she seemed emotionally indifferent and was not perturbed by the examination. But she screamed at the top of her voice nearly all the time and *appeared* to be in acute distress. There was no local tenderness to account for this; and both sensibility and motility appeared normal. Dr. Donnally, who was kind enough to let me see the case at the clinic of Dr. Wall of the Children's Hospital, could find no disease of a medical or surgical nature other than indicated by the symptoms afore mentioned. The sphincters were under control.

The psychasthenia of this case was clearly shown since the age of six months. The *eating of plaster and earth* is the consequence of a psychologic state—the feeling of inadequacy. This results in the desire for a satisfaction to terminate it. Everyone must be familiar with the feeling which even a superficial self analysis calls “below par.” With more or less intelligence the adult adopts the relief of food and drink, tobacco, distraction, excitement and what not. By these means he may abolish, or forget for a time, the feeling, which often passes away of itself in a cyclical manner. But when the longing is the expression of a constant physical dyscrasia, as in the case of this child, it is apt to be more continuous and insistent. This was clearly manifested in her by the *erosion of the flesh* which she maintained on her

wrist. The impulse which determined this will be clearly evidenced by a parallel case quoted by Janet.*⁵

The *screaming* of this child, too, was merely another experience of general discomfort, of psychasthenic depression wearing the guise of excitement. The malnutrition which prevented closure of the fontanels and produced a physical dyscrasia was responsible for the psychic state.

There is little doubt that the *lack of appetite* was a result of the psychasthenic state rather than its cause, and that the latter was in the first place produced by the intoxication of the caffeine imbibed constantly since the age of three months.

Again I quote a parallel case of a woman who had been prescribed 3 grains of caffeine each day.⁶ After eight months of frequent attacks of "angoisse" she gave it up, whereupon the attacks ceased. She, however, resumed the drug, but the attacks recurred; and she relapsed again and again until, finally, she ceased the caffeine. When one remembers that this is only the quantity contained in one and a half cups of coffee of average size and strength, or in about three cups of tea, a frequent and insidious cause of nervous depression is strikingly revealed.

Comparison with Tic.—The constant *scratching of the wrist* is comparable to the kind of act known as tic; for the pathogenesis of this performance is the same as that which Janet⁷ has shown to be the basis of the aberrant movements which constitutes the tics. The locality of a tic movement, although it may be in the first place determined by the irritation of a peripheral stimulus, is always conditioned by an idea. It is a pseudocoördinate intentional act. It is influenced for a time by volition, emotion or distraction; but the desire to perform it recurs periodically, and is hardly resistible without special training. It constitutes an impulsion, the performance of which is followed by satisfaction. It may be prevented or arrested by some other neutral or antagonistic act, which is efficacious not through mechanical opposition or physiologic incompatibility, but on account of psychological antagonism through a side tracking of attention. Subterfuges are often used to effect this, as, for example, the touching of the chin

* It was that of a young French girl who suffered very frequently from short periods of depression of mind. So distressing were these that nothing seemed too great to purchase relief; and the means she adopted was the dropping upon the back of her naked foot boiling water from the spout of a kettle. Her feet were covered with the scars of the burns she had thus caused; but the pain of these was preferable to the psychasthenic depression from which she suffered.

with the finger to prevent a torticollis. The slight pressure of this is mechanically negligible as an opponent to the powerful rotators of the neck, but the contrivance succeeds through its psychologic effect. Direct volition, too, may be used to stop the movement of a tic or to perform an incompatible movement or inhibition. It is upon this principle that Brissaud⁸ devised the treatment of tics by psychomotor discipline carried out by means of a series of exercises of immobilization and ordered movements viewed in a mirror and controlled at first by the will of the psychotherapist.

A tic is not constituted by direction and extent or character in general of a given movement; for, in the first place, every tic has been originally a physiologic act having a definite object. A movement can only be called a tic when it is inappropriate and persistent, and when the imperative desire for its performance does not cede to the conviction of its inutility, other than a means to immediate satisfaction, indifferent of the fact that appetite grows by what it feeds on, and that each performance of the act engraves the habit more and more deeply.

A pathognomonic sign is the distress which the patient feels on trying to suppress it. Gasping, increased rate of heart beat, cold perspiration and tremor may even occur, a syndrome which, along with the psychologic state at its root, is called *angoisse*, and plays a prominent part in nosological discussions of the psychoneuroses. Indeed, under the name *angstneurose*, Freud⁹ has placed it in a category of its own; but the enormous material collected by Janet¹⁰ seems to show that *angst* is merely an extreme manifestation of the emotional crises which have been called by him "forced agitation."

The screaming of this child may be compared to that form of tic of speech known as *coprolalia*. This consists of the imperative and irrational need to utter irrelevant obscenities. These, of course, are conditioned by ideas within the patient's mind; and Freud has raised the conditioning idea to the status of the primal cause of such a manifestation as *coprolalia*. Such a mechanism, however, could hardly be invoked in the case of a child aged two; and its cause must be sought in the general state of physical inadequacy, which has created a sentiment of discomfort which the child seeks to neutralize by the first stimulus obtainable. Thus, the psychologic content revealed by a tic of speech need not have

pathologic significance, the truly significant factor being the general state which permits of tic. The complexities of the dissociation hypothesis it would be far fetched indeed to invoke in this case.

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EXPERIMENTAL INVESTIGATIONS ON ACUTE EPIDEMIC INFANTILE PARALYSIS.—Meinicke (*Deutsch. Med. Woch.*, April 14, 1910, No. 15) reports on the results of further studies on the transmission of infantile paralysis to animals. In this work he has had much more success with transmitting the disease to rabbits than formerly. From his results on rabbits and apes, and from the results of several other authors, he concludes that the incubation time of this material when inoculated varies from a few days to several weeks. The strength of the virus and the amount injected seems to make a difference. He then gives the clinical signs, which are usually paralysis or paresis of some muscles or groups of muscles. The autopsy findings are negative, except for hemorrhagic spots in the brain and cord. Occasionally the cerebrospinal fluid was cloudy. On histologic examination these areas showed hemorrhage and perivascular infiltration. In the rabbits the lesions were the same as in the ape. The virus is capable of withstanding filtration, possesses a relatively great resistance to external influences, withstands glycerin and is not weakened especially or increased by passage through animals.—*Boston Medical and Surgical Journal.*

OBITUARIES.

ALOIS MONTI,
JOHANNES THEODOR AUGUST STEFFEN,
HEINRICH VON RANKE,
WILHELM CAMERER.

BY A. JACOBI, M.D., LL.D.

Within a year Germany has lost four eminent pediatricists, not Germany only, but all of us. All their names have been in the front rank of pediatric literature for decades. Their impress on medicine is of more than an ephemeral character. A good deal of what for us is common property was of their making. It is becoming that Americans should be acquainted with their names and doings, and that we should cherish the memories of those who have laid the foundations of pediatrics, such as we enjoy today.

ALOIS MONTI.—Born October 13, 1839, died October 30, 1909. He was the son of a court employee in the provincial service of the country, in Lombardy, and was educated in the Italian college of his neighborhood. Medicine he studied in Vienna; graduated in medicine in 1862, and in surgery in 1863. Professor Mayr—whose name is a deserving one in Austrian pediatrics—taught him the diseases of children, thus enabling him to act as a volunteer assistant in the St. Annen Kinder Spital. There he was soon advanced in rank. In 1869 I met him when he was the enthusiastic and active first assistant of Widerhofer, who was frequently absent in the service of the young imperial family and had often to rely on Monti as his representative in the classrooms and the hospital wards. Monti began his university teaching in 1870, in the capacity of a "Privat-Dozent" of pediatrics. In the year 1887 he was made "Extraordinary" (adjunct) Professor. In 1908 he received a high title, but was never promoted

to an "ordinary" regular professorship. That he owned several decorations of his and several other governments is almost self-understood. What is more important is that he was a member of learned societies in Rio Janeiro, Brussels, Moscow and Paris.

His contributions to medical science and art are very numerous. They were published in the *Jahrbuch für Kinderkrankheiten*, next in the *Centralzeitung für Kinderheilkunde*—which he founded with Babinsky—and in the *Archiv für Kinderheilkunde*. Some valuable essays of his have been published in Gerhardt's Handbuch. Besides many papers on epidemic cholera, renal diseases, spinal hyperemia, tenia, artificial feeding, anemia, etc., he published "Croup and Diphtheria," Vienna, 1879, second edition, 1884, and, together with Berggrün, "The Chronic Anemia of Childhood," Leipzig, 1892. Since 1897 he edited the lectures delivered at the Polyclinic, under the title, "Pediatrics in Single Papers" (*Kinderheilkunde in Einzeldarstellungen*); they fill three large volumes, and were followed, in 1906 and 1907, by six supplementary papers on the infections of the oral and pharyngeal cavities, on feeding, on growth, etc.

In 1887 he was one of the founders, and soon became the director, of maritime hospitals and asylums for sick, or scrofulous, or rickety children. They carried long-winded names of people in high positions, even of the sempiternal Austrian Emperor. That is why Monti worked incessantly until he succeeded in transferring the administration of all of them to the city of Vienna as late as 1908. In November of the same year he had his first apoplectic stroke; a new one in April, 1909, incapacitated him.

His practice was immense amongst the rich and aristocratic—who seldom have the intellect to select a good doctor, but still appreciated him on account of his knowledge, efficiency and plain talking—and amongst the poor, whose children he benefited. He was a good man and a great physician, not always pleasant in the presence of ignorance and neglect, and probably careless in regard to professional advancement, but one that has aided pediatrics more than Widerhofer, who was prevented from so doing by his obligations to the reigning family. Monti never lost sight of the scientific accuracy of modern medicine, and altogether exhibited the traits of the great clinicians, whose number is not rapidly increasing during the last few decades.

JOHANNES THEODOR AUGUST STEFFEN was born at Stettin, Germany, December 6, 1825, and died January 7, 1910. He studied medicine at the Universities of Bonn, Heidelberg and Halle. At the latter he was graduated in 1848. During the years 1847 and 1848 he was assistant in the medical clinic of Pfeuffer, in Heidelberg, and in 1850 he settled in Stettin, where he practiced general medicine. At an early time he paid particular attention to pediatrics. In 1853 he became the chief physician of the Child's Hospital in his city. That position he retained until 1894. Between 1865 and 1870 he published "Clinic of the Diseases of Children," in which he treated of the lungs and pleura. In 1879 he wrote for Ziemssen's Handbook, Vol. IV., on "Spasm of the Glottis," and on "Whooping-cough"; for Gerhardt's great and epoch-making handbook (Vol. V.) "The Diseases of the Brain." The third volume of his "Clinic," containing "The Diseases of the Heart," appeared in 1889. Many are his contributions in the *Jahrbuch für Kinderkrankheiten*, of which he was one of the editors, and in the "Transactions of the Society for the Diseases of Children," which is one of the most prominent sections of the German Association of Physicians and Naturalists. "Some Important Diseases of Children" appeared in 1895; "The Malignant Tumors of Infancy and Childhood" in the same year.

HEINRICH VON RANKE was born May 8, 1830, and died March 12, 1910, at Munich, where he was "Extraordinary" Professor of Pediatrics since his appointment in 1874. He was through a number of years the resident physician of the German Hospital in Dalston, London, in close proximity to, and acquaintance with, Charles West, and from time to time returned to England, with whose ways and literature he was thoroughly conversant. After his return to Munich he became the director and leading spirit of the Hauner Child's Hospital, and organized a large children's dispensary, which, together with the hospital, afforded him ample material for study and practice. Noma, diphtheria, hydrocephalus, spina bifida, and other subjects, were treated by him in special essays and pamphlets. Since his arrival in Munich its university was one of the principal places in Germany where diseases of children were taught and studied, for besides being an expert in his specialty he was known as a man of great general culture, a good teacher and a noble man.

WILHELM CAMERER was born October 17, 1842, and died March 25, 1910. For nearly a decade before his death he was confined to his bed or room by the results of rheumatic carditis, but still was always active. The *Monatschrift für Kinderheilkunde*, 1910, No. 1, enumerates his contributions to science and practice under 113 headings. He never wrote a text-book, though there was a time when he was only quite young and another time when he was full of ripe experience. He has earned and deserved his fame without it, and without a professorial position. He always engaged in the practice of medicine in small German towns, in which he worked without complex methods and without the aid of a large laboratory. Still none of the results of his labors have been refuted. They were such as to permit him to apply them to the practice among, and the therapeutics of, children. Pamphlets and essays on disinfection, metabolism, urine, growth of bulk and length, digestion, gout, composition of the young body, woman's milk, psychophysics, and statistics, historic and social questions, have emanated from him and indicate the breadth of his knowledge and the width of his horizon. Evidently the time has not yet passed in which eminence can be realized without prominence. Camerer's temperament and ambition were as modest as his surroundings. Still, he is recognized in Germany, and should be appreciated generally, as one of the makers of modern pedology.

UREMIA, SEQUEL TO SCARLET FEVER.—Child (*Journal of American Medical Association*, December 11, 1909) saw a boy, aged seven years, who passed through a typically severe infection of scarlet fever. The temperature fell on the sixteenth day, and there had been no albuminuria. Four days later twitching commenced and the patient became unconscious, the temperature gradually rising to over 104°F. Edema appeared, and convulsions continued for twenty-eight hours. The heart was dilated and the urine was loaded with albumin and casts. Purges and diaphoretics were employed, and finally venesection, when the child appeared to be *in extremis*. From the time of the bleeding the convulsions ceased and the patient gradually recovered consciousness. He eventually made a good recovery.—*British Journal of Children's Diseases*.

MISCELLANEOUS.

PROGRAMME FOR ANNUAL MEETING OF THE AMERICAN ASSOCIATION FOR THE STUDY AND PREVENTION OF INFANT MORTALITY.

Baltimore, November 9, 10 and 11, 1910.

President.—DR. J. H. MASON KNOX, Baltimore.

Secretary.—DR. L. E. LAFÉTRA, New York.

OPENING SESSION.

Wednesday Night, November 9th, at 8:15 P.M., in McCoy Hall.

Dr. Knox, presiding.

Address by the French Ambassador, Jules Jusserand.

Address by Dr. William H. Welch.

Informal reception and opening of the exhibition.

SECOND SESSION.

Thursday, November 10th, 10:30 A.M.

PHILANTHROPIC PREVENTION OF INFANT MORTALITY.

Chairman.—Dr. Hastings H. Hart, Director, Department of Child-Helping, Sage Foundation, New York City.

Secretary.—Mr. Sherman C. Kingsley, Superintendent, United Charities, Chicago.

(1) Address by the Chairman. (2) "The Relation of Infant Welfare to the General Social Movement," Mr. Sherman C. Kingsley, Chicago. (3) "Infants' Milk Depots and Infant Mortality," Mr. Wilbur C. Phillips, Secretary New York Milk Committee, New York City.

The papers will be discussed from the standpoint of the social worker, the visiting nurse, and the health officer.

THIRD SESSION.

Thursday, November 10th, 8:15 P.M.

MUNICIPAL, STATE AND FEDERAL PREVENTION OF INFANT
MORTALITY.

Chairman.—Dr. Wm. H. Welch, Professor of Pathology, Johns Hopkins Medical School, Baltimore.

Secretary.—Dr. John S. Fulton, Secretary-General International Congress on Hygiene and Demography, Washington.

(1) Address by the Chairman. (2) "Registration of Births," Dr. Cressy L. Wilbur, Chief Statistician Bureau of the Census, Washington. (3) "What the Obstetrician Can Do to Prevent Infant Mortality," Dr. J. Whitridge Williams, Baltimore. (4) "Some Studies on Milk Sugar," Dr. W. E. Helmholtz, Chicago. (5) "The Necessity for More Minute Study of the Causes of Infantile Mortality," Dr. John S. Fulton. (6) "The Duty of the Municipality in Relation to Infant Mortality," Dr. Joseph S. Neff, Philadelphia. (7) Dr. Herman M. Biggs, New York City.

FOURTH SESSION.

Friday, November 11th, 10:30 A.M.

MEDICAL PREVENTION OF INFANT MORTALITY.

Chairman.—Dr. L. Emmett Holt, Professor of Diseases of Children, Columbia University, New York.

Secretary.—Dr. Philip Van Ingen, 125 East 71st Street, New York City.

(1) Address by the Chairman. (2) "Some Statistics Derived from the Study of the Infancy of 1,500 Children, and a Contribution to the Causes of the Summer Infant Mortality," Dr. Herman Schwarz, New York City. (3) "Do Medical Schools Adequately Train Students for the Prevention of Infant Mortality?" Dr. Ira S. Wile, New York City. (4) "Erroneous Ideas of Infant Mortality, and Methods of Reducing It," Dr. S. W. Newmayer, Philadelphia. (5) (a) "Vaccine Treatment in the Prevention of Dysentery in Infants," (b) "The Education of the Father an Important Factor in the Prevention of Infant Mortality," Dr. Wm. Palmer Lucas, Boston. (6) "The Possibilities of Maternal Nursing in the Prevention of Infant Mor-

tality," Dr. Thos. S. Southworth, New York City. (7) "A Method of Determining the Influence of Medical Philanthropy in Reducing the Morbidity and Mortality of Infants," Dr. Henry L. Coit, Newark, N. J.

FIFTH SESSION.

Friday, November 11th, 2:30 P.M.

EDUCATIONAL PREVENTION OF INFANT MORTALITY.

Chairman.—Dr. Helen C. Putnam, Chairman of the Committee of the American Academy of Medicine to Investigate the Teaching of Hygiene, Providence.

Secretary.—Prof. Abby L. Marlatt, Department of Home Economics, University of Wisconsin.

TOPIC: *Healthy Parents? Right Customs and Wholesome Environment Being Essential Factors in Preventing Infant Mortality. How Are Normal Institutions Fitting Teachers to Establish, through Public Schools, Better Practices in Hygiene and Sanitation and Higher Ideals of Parenthood.*

(1) Chairman's address: "The Situation Observed in Forty Normal Schools." (2) "By the Study of School Sanitation," Dr. Herbert Burnham Davis, President of the Southwestern Normal School of Pennsylvania. Discussion continued by Dr. Guy Montrose Whipple, Assistant Professor of the Science and Art of Education, Cornell University; Prof. C. E. A. Winslow, Associate Professor of Biology, College of the City of New York, and Curator of Public Health, American Museum of Natural History, New York, and others. (3) "By the Study of Home-making," Prof. Flora Rose, Department of Home Economics, Cornell University. Discussion continued by Dr. Charles Ford Langworthy, U. S. Department of Agriculture; Prof. Marlatt, and others. (4) "By the Study of Biologic Science," Prof. Jessie Phelps, Michigan State Normal College. Discussion continued by Dr. Willard S. Small, Lecturer on School Hygiene, George Washington University; Dr. Llewellys F. Barker, the Johns Hopkins Medical School, and others.

ROUND TABLE.

In response to the wishes of several members it is planned to have a round table Friday evening, for informal discussion of biologic aims and methods in education.

CURRENT LITERATURE.

ABSTRACTS IN THIS NUMBER BY

DR. S. FELDSTEIN.

DR. FRITZ B. TALBOT.

DR. B. RAYMOND HOOBLER. DR. M. C. PEASE, JR.

DR. C. D. MARTINETTI. DR. S. W. THURBER.

DISEASES OF EAR, NOSE AND THROAT.

THEISEN, CLEMENT F.: REMOVAL OF A RHINESTONE FROM THE MIDDLE EAR OF A CHILD. (*Annals of Otology, Rhinology and Laryngology*, June, 1910, p. 351.)

A boy of five years had inserted a rhinestone, taken from a cheap ring, into the left ear about six weeks previous to coming under the author's care. The stone could be seen at first, and various attempts had been made to remove it, which were followed by a bloody discharge, which became purulent and stopped in ten days. A marked degree of deafness resulted. On examination, nothing could be seen but a mass of granulations, but a click could be heard when using a probe. The granulations were curetted away under anesthesia, and after cleaning out the canal the stone could be seen, but was so deeply situated within the middle ear that an incision had to be made behind the ear and the stone was finally removed by inserting a small ring curet behind it. For several weeks a discharge resulted and the hearing is a little dull.

S. W. THURBER.

CROCKETT, E. A.: THROMBOSIS OF THE LATERAL SINUS; WHEN TO OPERATE; WHAT TYPE OF OPERATION TO CHOOSE. (*Annals of Otology, Rhinology and Laryngology*, June, 1910, p. 356.)

Inasmuch as there is such a wide difference of opinion as to the questions when to operate and what type of operation to perform, the author was led to review his cases for the past five years, and draws histories and conclusions from 60 cases done by six different operators. All are agreed that operation should be performed as soon as the diagnosis is made. A steady rise in white blood cell count, with temperature and optic neuritis, are very great helps in deciding when to operate. The majority of cases were secondary to middle ear infection, and he puts himself on record in the statement that one should operate with the view of relieving a thrombosis in cases of acute or chronic sup-

puration when there is a rapid rise and remission of temperature for more than three days, especially with chills, headache, vomiting, general malaise and increasing leukocytosis. The type of operation is discussed under four heads. Two of the 9 cases reported in the article are those of children. Both died.

S. W. THURBER.

PATHOLOGY.

GOLDTHWAIT, JOEL, E.: DISTORTION OF THE FACE AND SKULL DUE TO CONTINUOUS FIXED POSTURE IN EARLY INFANCY. (*Boston Medical and Surgical Journal*, September 15, 1910, p. 429.)

The head in the first year or two of life is so soft and yielding that it can be moulded almost at will, and, because of this, many of the deformities or peculiarities in the shape of the head, which lead to varying degrees of disfigurement later in life, can be easily avoided if the fact is appreciated early enough. At this time the condition may be rectified by simply changing the position of the patient.

FRITZ B. TALBOT.

GILBERT, E.: THE BUCCAL MUCOUS MEMBRANE A POINT OF ENTRY IN TUBERCULOUS INFECTION.

The author has been experimenting on guinea-pigs with the following results:—

(1) The buccal mucous membrane, even in the absence of local lesions, can give entry to tubercle bacilli.

(2) This mode of entry is very frequent in infancy.

(3) Thorough prophylactic measures are advised, consisting principally of disinfection of the oral cavity.

C. D. MARTINETTI.

KARASAWA, W., AND SHICK, B.: THE PRESENCE OF DIPHTHERIA ANTITOXIN IN HUMAN SERUM. (*Jahrb. für Kinderhk.*, September 1, 1910, p. 264.)

The authors employed for their investigation Römers intracutaneous method. They found antitoxin in the umbilical blood of all the cases examined. It disappeared in the blood of the infant after the sixth week. In 11 out of 24 children from two

to twelve years of age no antitoxin was found. In 13 adults there were only 4 that had no antitoxin. In 3 children (six to eight years old) sick with diphtheria there was no antitoxin.

S. FELDSTEIN.

SURGERY.

BUXTON, DUDLEY W.: THE STATUS LYMPHATICUS IN ITS RELATION TO THE USE OF ANESTHETICS IN SURGERY. (*The Lancet*, August 6, 1910, p. 365.)

After an extended experience the writer concludes: "Given a competent anesthetist and a full recognition of the possible danger of overlooking the delicacy and physical feebleness of children in lymphatism, I think we may reassure the public about the reported perils of this state. If all doubtful cases were brought to the anesthetist for his examination and expert judgment some days antecedent to the employment of the anesthetic, it is probable that there would be fewer fatalities and certainly fewer and less severe after-effects from inhaling anesthetics."

B. RAYMOND HOOBLER, M.D.

MEDICINE.

KENDALL, ARTHUR I.: CERTAIN ASPECTS OF THE BACTERIOLOGY OF BACILLARY DYSENTERY. (*Boston Medical and Surgical Journal*, September 8, 1910.)

The fundamental principles underlying this work are: (1) The fact that bacteria in the presence of protein (and protein decomposition products) and fermentable carbohydrate select and act upon the carbohydrate in preference to protein in the vast majority of cases. The organisms break down enough protein merely to satisfy their nitrogen requirements in such instances. (2) In the animal body, carbohydrate likewise can be utilized to a very considerable extent to prevent the metabolism of the body nitrogen. (3) The majority of bacteria, including those commonly found in the cases of bacillary dysentery (*B. dysenteriae*, *B. coli* and the streptococcus), are facultative in respect to their dietary requirements and attack fermentable carbohydrates in

preference to protein or protein decomposition products. (4) Bacteria, acting upon protein, produce putrefactive products of various degrees of toxicity, but do not form these products when grown in media containing, in addition, carbohydrate which they can utilize, since in the latter case the fermentation takes precedence over putrefaction, at least until the sugar is exhausted.

The products of the dysentery bacillus which cause the most harm are largely, if not wholly, protein decomposition products. The formation of these putrefaction products can be prevented if a utilizable sugar is present.

(5) The blood of normal human beings contains about 0.2 per cent. dextrose as such.

(6) The normal sugar for man is lactose, a sugar of animal origin, in contradistinction to most other sugars, which are of vegetable origin. The lactose is utilizable by relatively few bacteria other than those of intestinal origin, while the animal sugars are fermentable by many types of organisms.

The remedy for this condition from the standpoint of bacteriology is to add an excess of sugar, which can be utilized by the bacteria within the intestinal tract and to restore to normal the amount of dextrose in the blood, so that even those organisms which have succeeded in penetrating within the body itself may have an opportunity to act upon sugar rather than upon nitrogen of the tissues of the body.

Dextrose infusions (2.5 per cent. chemically pure dextrose in normal saline solution) tend to restore this normal dextrose, and also to furnish the body with a considerable amount of fluid. The patient is benefited in two ways: (*a*) By protecting the tissues of the body to a considerable extent from the metabolism by the body itself, thus acting as a food, which is immediately utilized for the body needs, and (*b*) by providing a certain amount of dextrose for the invading organisms to utilize, thus further sparing the body nitrogen and reducing the production of toxic products by the bacteria themselves.

Feeding lactose by mouth (5 per cent. solution) brings about a similar change in the chemistry of the intestinal bacteria. The lactose furnishes food for the patient as well, reinforcing that obtained by the infusion of dextrose.

The intestinal bacteria, acting upon the lactose and its decomposition products (dextrose and galactose), change their chem-

istry from the putrefactive to the fermentative type, *i.e.*, produce acids, principally lactic, in place of putrefaction products, which must be detoxicated by the body if they are absorbed.

The colon bacillus, for example, in the presence of sugar, forms lactic acid, and consequently becomes an antagonist of the dysentery bacillus, in place of being a symbiote-forming putrefaction product, as would be the case if there were no sugar present. Coincidentally with the changes in the chemistry of the organisms mentioned, bacteria characteristic of the intestinal flora of normal nurslings begin to appear. The most prominent of these are *B. bifidus* and *B. acidophilus*, principally the former. These two organisms still further antagonize the dysentery bacillus, since these bacteria are energetic producers of lactic acid. They are among the most desirable and beneficial organisms which could be present under these conditions, since they perform the same functions in dysentery cases that they do in the intestines of normal babies, *i.e.*, antagonize and tend to keep down bacterial putrefaction in the alimentary canal.

FRTZ B. TALBOT.

AYER, JAMES B.: AN ANALYSIS OF 72 CASES OF PNEUMOTHORAX. (*Boston Medical and Surgical Journal*, September 29, 1910, p. 501.)

Ayer summarizes as follows:—

Tubercular cases comprised 69 per cent. of all the cases of pneumothorax at the Boston City Hospital in twenty-eight years. Most were young or middle-aged men, and most had a recent history of less than six months' illness. The left side was most often affected. Pain and dyspnea were by far the most common symptoms at onset. The treatment of these cases was that of the fluid present.

FRTZ B. TALBOT.

MAUREL, PIERRE: INFANTILE DIABETES. (*Annal. de Med. et Chir. Infant.*, September 1, 1910.)

Maurel has seen several such cases at the Bourboule and believes that they would be found more frequently if they were looked for. An early diagnosis is important. The symptoms are the same as in adult diabetes. Clinically, it is a pancreatic diabetes. Polyuria is one of the earliest and most frequent signs. Polydypsia is very marked; the baby demands the breast constantly

and does not like to stop nursing. Polyplagia is less constant and less marked. Glycosuria is very important and should be permanent. There is proportionately more sugar than in adult diabetes, while acetone is variable. The onset is insidious and there is always progressive wasting. In young babies the disease may progress to death in a few days, while in children it may last two or three years. Treatment is, of course, hygiene and dietetic. The smallest amount of sugar is given in the milk modifications. When syphilis is the cause of the disease, mercury and iodids are given. Occasionally arsenic helps. FRITZ B. TALBOT.

HAUSHALTER, P.: PAROXYSMAL HEMOGLOBINURIA IN A FOUR-YEAR-OLD CHILD. (*Annal. de Med. et Chirg. Infant.*, August 15, 1910.)

The case reported is of interest because of the youth of the patient, the relation between hemoglobinuria and exposure to cold, and to standing up, and the symptoms which follow attack, *e.g.*, syncope, pallor and malaise. Albumin was passed after the attack, the patient was constantly pale, and the red cells broke up easily in saline solution. FRITZ B. TALBOT.

THIEMICH, MARTIN: SUPPURATIVE DISEASES OF THE KIDNEYS AND URINARY TRACT IN INFANCY. (*Jahrb. für Kinderhk.*, September 1, 1910, p. 243.)

The clinical differentiation between cystitis and pyelitis is in infancy very rarely possible, as the only truly differential test, namely, the result of internal catheterization, is at this period of life unavailable. Local tenderness and enlargement of the kidneys are not readily evinced, and but seldom present. Uranalysis is almost never directly helpful, as the amount of albumin, number and character of the leukocytosis, and the character of the epithelial cells, offer no differential criteria. Nor is the type of the fever an aid in the differential diagnosis between the two diseases.

The author would, therefore, with Goepfert, group these cases under the generic name of pyelocystitis. The author thinks that hematogenous infection of the kidneys plays a more important rôle in these cases than is usually assumed. In autopsies on 10 cases there were found small abscesses in the cortex of the kid-

neys, or evidences of healed abscesses. These were present in the cases in which the renal involvement supervened on top of another disease. The author would therefore distinguish these cases of pyelonephritis from cases of pyelocystitis, in which the disease is usually of a much milder type. In the treatment, flushing of the kidneys is of more importance than the administration of urinary antiseptics.

S. FELDSTEIN.

GACHTGEUS, R.: TYPHOID IN THE FETUS. (*Gazz. degli Ospedali*, 1909, No. 41.)

Typhoid lesions in the fetus have already been observed. The author recently examined a fetus from the miscarriage of a woman ill with typhoid. From all the organs Eberth's bacilli were obtained in great quantities. The Widal reaction of the fetal blood was negative. The placental blood gave good cultures. The placenta itself, on examination, revealed the bacilli in its tissues. Thus the transmission of typhoid to the fetus is demonstrated. The resistance to infection in this case is very small, as the infection takes place directly through the blood, whereas, in the adult, it usually passes through the lymphatic system first.

C. D. MARTINETTI.

HYGIENE.

SQUIRE, J. EDWARD: THE INCIDENCE OF TUBERCULOSIS IN CHILDREN, WITH SPECIAL REFERENCE TO SCHOOL ATTENDANCE. (*The Lancet*, August 6, 1910, p. 337.)

*Dr. Squire does not believe the diagnosis of tuberculosis should be made merely because there is a reaction to tuberculin, though he acknowledges the test to be a valuable addition to the methods of clinical investigation. He believes the per cent. of tuberculous children is placed too high. In his examination of 1,680 London school children he made the following observations:

5 per 1,000 gave definite signs of pulmonary tuberculosis.

8 per 1,000 gave signs which might have been caused by tuberculosis.

28 per 1,000 gave lung signs due to conditions other than tuberculosis.

The writer is convinced after the examination of several thou-

sand school children that pulmonary tuberculosis at least is not a frequent cause of serious ill health in children of school age.

He calls attention, however, to the fact that even though the child may not have a definite pulmonary lesion, yet if it comes from a home in which there is tuberculosis it may act as a carrier of the disease and thus be a menace to other children.

B. RAYMOND HOOBLER, M.D.

MACY, MARY SUTTON: CRIMINAL TENDENCIES OF ADOLESCENT GIRLS. (*The Woman's Medical Journal*, June, 1910, p. 115.)

The author places especial stress upon the nature of the material acquired by the child from its early environment, upon the mental associations, and upon the accuracy of the adjustment between the ego and the social body in which the individual lives. It is unfortunate that in many homes too little attention is paid to the early environment, with the result that false ideals are developed. On the other hand, too much emphasis is placed in the schools and by the schools upon the acquisition of knowledge, and too little care is given to the training of habits and methods of thinking.

M. C. PEASE, JR.

THERAPEUTICS.

ROSENSTERN, J.: CALCIUM AND SPASMOPHILIA. (*Jahrb. für Kinderhk.*, August 1, 1910, p. 154.)

The effect of the ingestion of calcium chlorid by infants suffering from spasmophilia on the electrical reaction was carefully studied by the author. In 15 out of 20 cases there was found a reduction in galvanic irritability; in the 5 remaining cases no change was observed. The maximum effect was observed at the end of three to nine hours, when the galvanic irritability became normal. After sixteen to thirty-two hours the electrical reaction returned to its original state. In many cases, simultaneous with the change in electrical reaction, the Chvostek sign disappeared, occasionally also the Trousseau phenomenon. The infants became more quiet and the laryngospasm disappeared for ten to twelve hours. Other calcium salts gave similar results. The effect with magnesium chlorid in a few cases was similar to that

with the calcium chlorid. With a 3 per cent. NaCl solution anode opening contraction was found increased, whereas the kathode opening contraction was uninfluenced. The attacks of laryngospasms reappeared with the ingestion of sodium chlorid.

S. FELDSTEIN.

DEBRI, R.: CASE OF TETANUS TREATED WITH MAGNESIUM SULPHATE. (*La Pédiatrie Pratique*, 1910, No. 7.)

The patient, a girl, was ill five days with a very severe form of tetanus with elevated temperature. Serum and chloral gave no improvement. Finally, 30 minims of a 25 per cent. solution of magnesium sulphate were injected in the spinal canal. Instantly the contractions and convulsive movements disappeared. They reappeared, however, thirty hours later, when the child died from dyspnea.

C. D. MARTINETTI.

WATERHOUSE, RUPERT: BROMOFORM POISONING. (*The Bristol Medico-Chirurgical Journal*, June, 1910, p. 129.)

As the author points out, most of these cases occur in children who are taking bromoform to control whooping-cough. The dangers of the drug are increased by the fact that some children have a distinct liking for it; and also by the fact that bromoform will settle to the bottom of any mixture, so that a very large quantity may be taken with the last dose. The drug has a tendency to decompose, liberating free bromid, which will not be noticed if it is put up with tincture of senega.

The symptoms of bromoform poisoning in mild cases are headache, faintness, giddiness, uncertain gait, incoherent speech, causeless laughter and drowsiness. In severe cases there is insensibility, pallor, cyanosis, loss of corneal and other reflexes, anesthesia, weak, irregular, rapid pulse, retching, vomiting, and rarely involuntary defecation. Respiration becomes rapid and shallow, and may fail. Pupils are contracted or pin point, but exceptionally may be dilated. As a rule, the characteristic bromoform odor pervades the breath, and may be detected as late as twenty-four hours after the drug has been swallowed.

The treatment is the one usually followed for depressant poisoning. The author cites a number of cases of his own or in his experience, and reviews the literature of the subject quite fully.

M. C. PEASE, JR.

MORSE, JOHN LOVETT; TALBOT, FRITZ B.: "THE TREATMENT OF INTESTINAL INDIGESTION IN CHILDREN ON BASIS OF THE EXAMINATION OF STOOLS AND CALORIC VALUES." (*The American Journal of the Medical Sciences*, June, 1910, p. 781.)

The writers have attempted to control the feeding of children by paying particular attention to the caloric needs of the individual and by a careful study and examination of the stools.

Their estimation of the caloric needs of the average child at different ages is shown in the following table:

Age.	Total caloric need.	Calories per kilo.	Total proteid need.	Proteid need per kilo.
4 years	1,200	70	55 grams.	3.5 grams.
8 years	1,400	60	60 grams.	3 grams.
12 years	1,600	50	75 grams.	2.5 grams.

The various types of pathologic stools which they attempt to differentiate are the fatty stool, the carbohydrate stool and the catarrhal stool.

After many examinations of stools, both chemically and microscopically, they believe that they can eliminate the longer and more accurate chemical analysis and depend on a microscopic analysis only, which can be made quickly and answers perfectly well for diagnosis.

B. RAYMOND HOOBLER, M.D.

INFANT FEEDING.

USUKI, S.: THE METABOLISM OF FAT IN THE NORMAL AND SICK INFANT. (*Jahrb. für Kinderhk.*, July 1, 1910, p. 8.)

Chemical investigations were made on eleven infants by means of a new method, in which ether, boiling alcohol and petrolether were employed for successive extraction of the fats from the dried feces. The splitting up of fats in the intestines of the infant is very complete, as only about 1 per cent. escaped digestion. Fat, as it occurs in the stool, consists of fatty acids, neutral fats, soaps of the alkalies (Na. K., etc.), and of the alkaline earths (Ca. Mg., etc.). The fatty acids and the soaps make up the greater part of the fat. The neutral fat and the soaps of the alkalies do not vary much in health or disease. They each represent about 10 per cent. of the total fat contents of the stool. The percentage variations of the fatty acids and the soaps of the alkaline earths are much

greater than those of the other two constituents. In normal acid stools the fatty acids predominate over the soaps, while in "fatty stools" the relative proportions of these two are reversed.

Careful studies were made on the effect of the administration of malt extract. It was found that this food regularly led to disappearance of the "fatty stools," which became acid in reaction. These contained more dry substance, but a relatively diminished percentage of fat, and a relatively and absolutely diminished amount of soaps. The average loss of weight was about 13 per cent., a greater loss than occurs normally. The administration of an equal amount of maltose did not lead to a disappearance of the "fatty stool" nor to a change in the alkaline reaction. The fat absorption, however, was much better with maltose than with malt extract.

In diarrhea the absorption was more interfered with than the splitting up, so that the fatty acids were abnormally increased in the stools. The diminished soap formation after malt extract the author thinks most likely due to formation of carbohydrates in the extract, which are not so readily absorbed as is pure maltose.

S. FELDSTEIN.

HOFFMAN, E.: FERMENT ACTION AND FAT ABSORPTION IN INFANCY. (*Jahrb. für Kinderhk.*, September 1, 1910, p. 280.)

The presence of amylolytic ferment in the feces was determined by means of Müller's starch-paste plate. The author found that the consistency, number and reaction of the stools did not influence the ferment content of the feces. The diet also had no apparent influence. In a three-weeks-old breast-fed baby amylolytic ferment was present. In cases of acute digestive disturbances the ferment and fat in the serum were entirely, or almost entirely, absent. During convalescence the ferment and fat rose simultaneously and almost parallel with the increase in weight. In a case in which the ferment was absent in the stool the intestinal contents and pancreas itself after death showed very little ferment action. In chronic cases of indigestion there was no parallelism between the ferment content of the stools and the fat content of the serum. As a result of this study the author thinks that the disturbed function of the pancreas is a factor in acute digestive disturbances. The method of ferment estimation may also be of value in the prognosis.

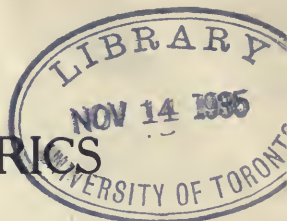
S. FELDSTEIN.

ARCHIVES OF PEDIATRICS

NOVEMBER, 1910.

LINNÆUS EDFORD LA FÉTRA, A.B., M.D.,
ROYAL STORRS HAYNES, Ph.B., M.D.,

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ORIGINAL COMMUNICATIONS.

PYELOCYSTITIS IN INFANCY.

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Baltimore, Md.

(From the Städtisches Kinderasyl in Berlin, Professor H. Finkelstein,
Physician-in-Chief.)

The attention of the medical world was first called to the symptom-complex, now generally known as pyelocystitis, by Escherich* in 1894, under the title of colicystitis.

In the same year L. Emmett Holt† reported 3 similar cases, under the title of acute pyelitis. The comprehensive article of Finkelstein,‡ and a little later that of Trumpp,§ first emphasized the frequency and importance of this condition.

Since then there have been numerous valuable contributions

* "Mittel d. Vereins d. Ärzte Steiermark," No. 5, 1894.

† "Three Cases of Acute Pyelitis in Infancy," L. Emmett Holt, ARCHIVES OF PEDIATRICS, November, 1894.

‡ "Ueber Cystitis in Säuglingsalter," Finkelstein, J. K., XLIII, September, 1896.

§ Trumpp: Graz. "Versamml. d. Gesellschaft Deutscher Naturforscher u. Aerzte," September, 1896.

upon this subject, especially by Cnoff,¶ Fromm,|| and Langstein** in German, and Abt†† and Box‡‡ in English, and finally the recent very comprehensive articles by Göppert,§§ so that it will be impossible to give much that is new. However, on account of the abundance of hospital material observed, and particularly because of its bearing upon the etiology, pathology and treatment of this condition, I feel justified in presenting the following article.

The following study is based upon a series of 80 cases, derived from a large foundling hospital; it is made up largely of young infants, many of whom suffer from nutritional disorders, and among whom infections, particularly gripe, are very common. The cases were very kindly placed at my disposal by Professor Finkelstein.

In this series I find 58 females and 22 males. This gives a percentage of 27½ for males, which is more than double the highest previously reported percentage of 11 by Göppert.* The above statistics would tend to show that the disease is much more common among males than previously believed.

The youngest child in this series was eleven days, the oldest twenty-two months. Under one month there were 3; from one to three months, 25; from three to six months, 22; from six to nine months, 14; from nine to twelve months, 10; and over one year 6 cases.

Fifty-four cases occurred between the first of December and the first of June. The months of May, February and March had respectively 13, 11 and 10 cases, while June had none and October and November each 3.

The colon bacillus† is the common, exciting cause of this condition, and through it received the name under which it is best known, colicystitis. This organism was demonstrated in quite a

¶ "Ein Kasuistischer Beitrag zur Lehre von der Bacteriurie," Cnoff, *Münch. Med. Woch.*, No. 40, 1903.

|| "Ueber Cystitis im Kindesalter," Eugene Fromm, *Centralb. f. Kinderh.*, No. 10, 1904.

** "Bemerkungen zur Diagnose u. Behandlung der Cystitis u. Pyelitis im Kindesalter," Langstein, *Therap. Monat.*, May 1907.

†† "Urinary Infection in Children," Abt, *Journal of American Medical Association*, December 14, 1907.

‡‡ "On Certain Bacterial Infections of the Urinary Tract in Children," Charles Box, *Lancet*, January 4, 1908.

§§ (a) "Ueber die Eiterigen Erkrankungen der Harnwege im Kindesalter," F. Göppert, *Ergeb. d. Inneren Med., u. Kinderh.*, Bd. II., S. 30.

(b) "Die Pyelocystitis des Kindesalters," F. Göppert, *Berl. Klin. Woch.*, 1909, No. 14.

* Previous reference.

† Escherich.

number of this series. The proteus,† the pyocyaneus,§ the subtilis,¶ the lactis aerogenes,|| the tubercle,** and other bacteria have been described as causative factors.

The proteus bacillus was found twice, the lactis aerogenes once in this series.

Zelenski and Nitsch†† report 3 cases in which they were able to demonstrate the tubercle bacillus, both by slide preparation and also through animal experiment, as a cause of this condition. By what means does the infection reach the pelvices or bladder? The short urethra and its close proximity to the anal orifice in the female, form an easy passage for the bacillus coli to the bladder, especially if soft stools soil the vagina,‡‡ and readily explain the greater percentage of females afflicted.

That the infection can directly enter the urinary apparatus from the blood has been described by various authors.§§

One other possible source of infection, described by Wreden, is a direct transmigration of the colon bacillus from a damaged intestine into the bladder.* The question as to which of the above avenues forms the most probable entrance will have to be decided by careful culture experiments.

Any of the acute infections seems to act as a predisposing factor; also the severe nutritional disorders, probably in that they cause a general lowering of resistance. During the year ending February 1, 1910, there were 22 cases of pyelocystitis at this institution. One-half of these occurred in the months of November, December and January, during a severe epidemic of grippé.

Fifty-nine of our cases were directly preceded by either some infection or an acute nutritional disorder, while only 7 occurred under observation which were not preceded by a previous serious disorder. The 14 remaining cases entered with this condition, and while it is often not possible to get a previous history, we must assume that quite a number of these had also a definite predisposing factor. Twenty-one cases were preceded by some infection of the respiratory apparatus, of which 7 were grippé and 2 diphtheria; 12 others by otitis media, 7 by alimentary intoxica-

† Baginsky, Lehrbuch d. Kinderhk.

§ Ibid.

¶ Finkelstein.

|| Escherich.

** Zelenski and Nitsch.

†† Beitrag zur Etiologie der Cystitis bei Kindern, Przeglądlebarski, 1904, No. 1 (Polish).

‡‡ Escherich.

§§ See previous reference, Finkelstein, J. K.

* Zur Aetiol. der Cystitis. *Centralb. f. Chirurg.*, 1893, No. 27.

tion,* 6 by septic conditions, 5 by enteritis follicularis, 4 by stomatitis, 2 by active syphilis with profuse eruption, and 1 each by tuberculosis and vaginitis.

The 7 cases previously referred to must be considered primary, as they occurred while under careful observation at this institution, and showed absolutely nothing which might predispose to pyelocystitis.

Of 20 autopsies the kidney pelvices and bladder both showed pathologic changes in fifteen instances; three times the pelvices were alone involved, once the bladder alone, and in one instance there were no pathologic findings in the urinary apparatus, although the child had had pyuria six weeks previous to death.

That the lesion can be a simple catarrhal inflammation which quickly heals is shown in the following case where the patient, developing a pyelocystitis after an alimentary intoxication and dying seven weeks later of acute tuberculosis, gave no pathologic findings in either pelvices or bladder.

CASE NO. 58. A. E., male of eleven months. Admitted July 13th. Child had been in Asyl seven weeks and was given out into a family (Reconvalescence Pflege) in improved condition, with good stools and weighing 5,400 grams. It is returned in five days, weighing 4,980 grams, very pale, depleted, hot, with glaring expression, and labored breathing. Urine gives albumen and sugar reactions, sediment negative. Child put on tea diet.† On the next day child's appearance is better, skin is dry, very little urine, pulse 160.

Diagnosis:—

Alimentary Intoxication.—Two days later child had severe itching eczema, furunculosis, phimosis, glands of axilla and groin enlarged, weight 4,760 grams. Urine: Sugar negative, albumen slightly positive, sediment contains pus cells and epithelium; Pirquet positive; child gets urotropin 0.1 four times for a day, then three times daily 0.1 salol. In a week the urine becomes normal, and remains so upon repeated examinations until the end; salol is given for four weeks.

Six weeks after admission of child it becomes fretful and sensitive to touch, develops an acute tuberculous pneumonia, from which it dies in about a week. (Note temperature curve 58.)

* Finkelstein's nomenclature (Cholera Infantum or Enteroc-Catarrh).

† A very weak tea flavored with saccharin.

Postmortem Findings:—

Lungs.—Hepaticization of left upper lobe, right upper lobe reddish, yellow infiltration; adhesive pleurisy on both sides.

Kidneys.—Slightly congested.

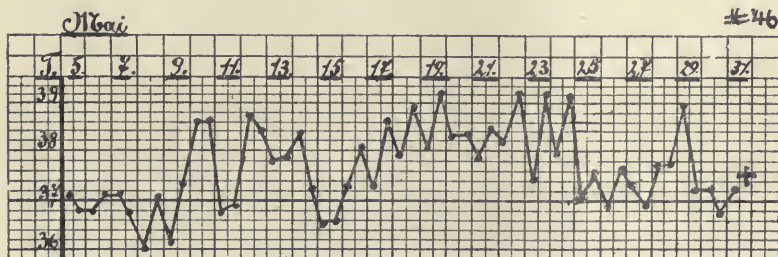
Spleen.—Enlarged.

Liver.—Very fatty.

Bladder.—Without abnormal findings.

The following case, in which patient died during an eclamptic convulsion, likewise gives the pathologic findings in a very mild case.

CASE No. 46. C. M., female of one year, admitted April 5th. A backward child, weight 5,400 grams. Two weeks after admission child develops grippe, with vomiting, coryza and pharyngitis; has also a peritonsillar abscess a little later; alimentary decomposition* develops with a loss of weight in three days of 600 grams, thin and frequent stools, much vomiting and distended abdomen. Six weeks after admission urine shows slight albumin reaction, pus cells and hyaline casts; urotropin ordered. Four days later child develops severe tetany (spasmophilia) with laryngospasm, Chvostek's phenomenon and K. O. Z. under I. Child dies two weeks later during an eclamptic attack. (Note Curve No. 46.)

*Postmortem Findings:—*

Heart.—Somewhat enlarged, especially left ventricle.

Bladder.—Injected.

* Finkelstein's Nomenclature. (Acute Infantile Atrophy or Marasmus.)

Organs.—Otherwise show no change.

In the 2 following cases, one with death from uremia, the other from colimeningitis, the lesions of acute pyelocystitis are well shown.

CASE NO. 7. A. W., female, age eleven days, admitted May 22d. A restless child, with grey-yellow septic appearance, mouth red, umbilicus secreting, empties pus on pressure, sound passes 1 cm. into umbilicus, stools bloody and contain much mucus, incoördinate movements. Child alternates between low moaning and loud screaming. Three days later, movements sluggish, mouth red, child drinks very poorly.

Urine.—Color somewhat icteric, albumin positive, slight reduction of Fehling's sediment contains bile, salt crystals, numerous red blood cells, pus cells and granulated casts. Three days later child vomits, is still somewhat soporous. Two days later condition is improved; color good; small phlegmenous infiltrations on abdomen, umbilicus does not secrete, child cries vigorously, seems to have severe colic. Urine contains numerous pus and red blood cells. In afternoon, spasm of eye muscles and extremities, child moans much, Cheyne-Stokes respiration, somnolent condition, protrusion of fontanel.

Spinal puncture gives a purulent fluid, in smear many leucocytes and diplococci.

Next day, slight opisthotonus, no palsy or spasm of extremities, fontanel tense and protruding. Spinal puncture gives cloudy fluid, a culture of which shows coli and diplococci.

Urine.—Dark, bloody, albumin positive; in sediment numerous red blood and pus cells and bacteria; granulated hyaline and bacterial casts.

Breathing irregular, pulse accelerated, spasm of eye muscles and extensor spasm of extremities. Phlegmon on abdomen, right kidney larger than left.

Next day, meningitis progresses slowly, subjectively some improvement. Child cries as soon as one touches it, somewhat somnolent, no opisthotonus, urine unchanged.

Following day, vasomotor irritation, grey skin color, phlegmon in abdomen necrotic, umbilicus secretes a sanguineous fluid, frequent bloody vomiting. Spinal puncture gives bloody, viscid, purulent fluid. Urine the same, child going down hill, dies June 1st.

Postmortem Findings:—

The umbilical arteries are blocked with pus for a distance of 5 or 6 cm., pus cavity beneath umbilicus, peritoneum intact.

Right kidney somewhat congested, no noticeable nephritis, very severe purulent meningitis, especially at base in region of foramen magnum.

Bladder hemorrhagic and swollen.

CASE No. 24. K., very young female. Admitted June 30th. A marasmic, apathetic child, very pale, with dry skin. Fontanel depressed, lips dry, cervical glands lentil size, lungs normal, abdomen also.

Two days after admission child in somnolent condition, severe vomiting, dyspeptic stools. Five days later condition unchanged, furuncle on head. On following day child quite weak, slight tremor, transitory erythema; next day weaker, some opisthotonus, spleen not palpable. Next day fontanel much depressed, bulging of both ear drums, convulsions of arms and legs, cataleptic in character. Paracentesis. Two days later, opisthotonus continued, râles over right lung, no vomiting. Urine contains albumin and pus cells but no casts.

A progressive uremic condition follows, from which patient dies after three days.

Postmortem Findings:—

Lungs.—Bronchitis. *Kidneys.*—Slightly opaque. *Pelvices.*—Engorged and turbid, in right one linseed size concretion. *Bladder.*—Mucosa loose and swollen, in neck small concretion.

In cases in which the proteus bacillus was the exciting cause, the inflammatory condition went on to the stage of local necrosis, giving the appearance of a diphtheritic affection.

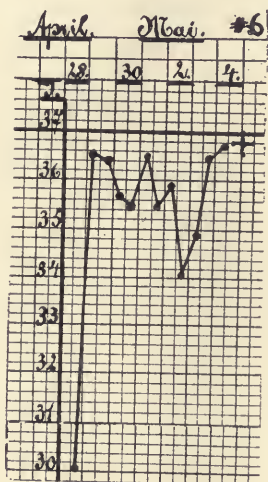
CASE No. 6. M. P., female of four months. Admitted April 28th. A very marasmic, emaciated baby, pale cyanotic appearance, bulbar atrophy, chicken breast, numerous petechial hemorrhages over body, glands not palpable; spleen, palpable; abdomen sunken in, heart sound normal, some râles over lungs.

Next day, stools hemorrhagic, contain much pus and mucus; blood culture negative; child in state of severe collapse.

Two days later, opisthotonus, stools unchanged.

Next day, urine taken with catheter is cloudy, thick, purulent, malodorous, and of alkaline reaction; in sediment are numerous pus cells and bacteria; culture shows proteus, liquefying gelatin,

no streptococci. Culture from blood of saphenus vein and of spinal fluid negative. Clinically, the case is of interest by the appearance of numerous petechiæ, which are also produced by rubbing or exerting pressure on skin. (Note curve No. 6.)



Postmortem Findings:—

Brownish-green discoloration of bladder mucosa, with numerous punctiform hemorrhages and dirty purulent deposits.

The pelvices of kidneys filled with dirty, brownish pus; papillæ on both sides covered with dirty deposits; kidneys moderately enlarged and show punctiform hemorrhages.

CASE No. 9. E. S., female, age four months, admitted February 15th. A moderately developed twin child. Other twin born with rash, and died shortly after birth. This baby, bottle-fed, fourteen days after birth de-

veloped coryza and rash, also green stools. Child shows desquamative erythema on trunk and face, xerosis and ulcer cornea, deep fissures at mouth and anus, fever, appearance slightly cyanotic, extremities cold, several furuncles on the extremities; glands not enlarged; kidneys not enlarged; stools thin and slimy. Urine, hemorrhagic appearance, contains some albumen, numerous pus cells, clumps of bacteria, no kidney elements; a culture shows proteus liquefying gelatin, also scanty growth of bacillus coli. Two days after admission profuse mucopurulent secretion from nose, furuncle on head, passes very little urine, bleeding fissures at anus.

Urine.—Reaction acid, much albumen, many pus cells, bladder epithelium, tailed epithelium, clumps of bacteria. Five days later, liver large and hard, good stools, gradual weakening and death after three days.

Postmortem Findings:—

Bronchopneumonia, hemorrhagic foci in lower lobes of both lungs. Liver fatty and of orange color. Bladder in trigonum blackish-green, necrotic discoloration; out of which some light yellow, purulent tissue projects.

Both kidneys about one and one-half times normal size, relaxed, yellow-red color, capsule easily stripped off, spotted

hemorrhagic surface, showing some white, necrotic foci of pin-head size. Cut surface moist and swollen, cortex enlarged, pyramids reddened and inflamed, pelvices markedly congested, with profuse punctiform hemorrhages; spleen not enlarged.

The following led rapidly into acute parenchymatous nephritis.

CASE No. 2. H. K., female, six months of age, admitted May 2d. A well nourished child, has had suppuration of nose for four weeks, is apathetic, cyanotic and pale, has poor appetite, twitching of arms, accelerated respiration; pulse 144, temperature 39. Border of nose is excoriated, and there are some linseed size ulcerations on face, throat is red, over both lungs some rhonchi are heard, left kidney seems enlarged; stools dyspeptic; urine, much albumin, many pus cells, some cubical and tailed epithelium, epithelial casts. Child develops stomatitis and pharyngitis, breathing becomes labored, has no appetite, kidneys become enlarged, there is a tremor of the hands.

Child becomes weaker and weaker and dies five days after admission.

Postmortem Findings:—

Severe swelling and redness of bladder mucosa, with many extravasations of blood, both kidneys are large, soft, with serous infiltrations and parenchymatous cloudiness, the pelvices are slightly injected, slight bronchitis, no tuberculosis.

CASE No. 4. H. K., female, age six weeks. Admitted July 6th. An emaciated, small child, did not receive breast, was profusely nourished and became gradually emaciated. Child cries much, passes large quantities of urine, has diarrhea and vomits. Last night had convulsions. Child has glaring look, abdomen is tympanitic, otherwise no findings. Stool yellow-green; urine, acid, colorless, reduces Fehling's. Two days later urine findings same, except reduction is less marked. Child has rice soup stools; temperature 38°C. Six days later urine contains many pus cells, some tailed epithelium, and masses of motile bacilli. Child becomes weaker and weaker, and dies two weeks after admission.

Treatment.—Irrigation of bladder with solution of silver nitrate.

Postmortem Findings:—

Lungs.—Some atelectasis.

Bladder.—Mucosa slightly dilated, with red spots, especially at openings of ureters.

Gray spots in neck of bladder and slight pigmentation in fundus, kidneys softened, pelvices slightly injected and grey-red.

CASE No. 44. M. K., male, newborn, admitted January 25th. A fine child, weighing 3,170 grams; when two weeks old child has dyspepsia* and stomatitis. One week later child very restless, cries much. Urine contains albumin and many pus cells. Urotropin, 0.2, four times daily, ordered.

Five days later child marasmic, has slight jaundice.

Urine findings continue same. Child gradually goes down hill, dying two months after birth.

Postmortem Findings:—

Kidneys are enlarged, dark red, appearance spotted; parenchymæ opaque; yellowish-white nodules in cortices and medullæ; pelvices engorged. Bladder without abnormal findings.

That tendency to septic nephritis and abscesses of kidney are not at all uncommon is shown by the following cases:—

CASE No. 8. G. Q., male, two months of age. Admitted April 13th. Weakly child, has been sick five days, skin, mucous membranes and conjunctivæ are slightly jaundiced; child is somewhat soporous, drinks poorly, and lies mostly with his mouth open; there is marked opisthotonus, mild spasm of extremities; reflexes, however, are not increased. Voice is clear, eyes bright, mouth clean, spleen not enlarged, kidneys palpable and somewhat enlarged, fontanel not protruding, liver overlaps costal arch three fingers' breadth, pulse very slow, breathing very slow and irregular, no hyperesthesia, fundi of eyes normal, stool slimy and broken up, no micturition. After ingestion of food, vomiting, even after tea. Next day, high fever, child restless and moaning; there is slight erythema on breast and face. Soporose condition continues, also vomiting, jaundice becomes more pronounced, hemorrhagic fissures appear on flexor portion of knees and roseolæ are noticed on abdomen and on thighs; spleen not palpable; no micturition, no movement of bowel. From spinal puncture clear fluid obtained under normal pressure. Child dies on following day.

Postmortem Findings:—

Both sides pyelonephritis with copious miliary and larger abscesses, catarrhal cystitis, cloudy swelling of liver.

* Finkelstein's nomenclature (Intestinal indigestion).

CASE No. 14. J. K., female, age seven months, admitted February 14th. Nutritional condition good, good tonus, skin slightly cyanotic and of remarkably livid appearance, accelerated respiration, nostril breathing, pulse regular and frequent; on trunk and extremities several blue spots, also on face; marble-like appearance of cheeks, some opisthotonus, high fever; child very restless, moans much, and is slightly soporous.

Urine—Reaction acid, much albumin, many pus cells, no sugar.

Two days later, numerous petechiæ on upper extremities, fontanel somewhat tense, some opisthotonus, labored breathing, urine same, but also some red blood cells.

Following day, condition growing worse, great weakness, slightly soporous, accelerated breathing, distended abdomen; spinal puncture, no findings; blood culture shows colon bacillus, also culture from catheterized urine shows some.

Following day, moans much, breathing labored, anxious expression, heart sounds very low, heart dullness increased.

Postmortem Findings:—

Lungs normal, heart double the size of a fist, right ventricle dilated. Large, congested kidneys, on surface alternating light-yellow and reddened spots. In cortex many abscesses, parenchyma cloudy and swollen; in right kidney hemorrhagic infiltration of hazel-nut size. Pelvic mucosa slightly reddened, bladder unchanged.

CASE No. 18. I. B., female, age eight and one-half months. Admitted January 1st. Bottle baby, sickened with fever and convulsion three days ago. Very lively child, craniotabes, all organs normal, throat somewhat reddened. Day after admission has high fever, throat more severely inflamed, on back and abdomen rather diffuse erythema; stools soft, general findings good. Next day, face pale, scarlet coloration of neck and breast. Following day, spleen palpable, volatile erythema; stool contains much mucus and microscopically much pus and epithelium.

On the following day ear drum on right side somewhat reddened, without lustre and bulging; stool contains some blood.

Day later, appetite bad, child cries on being touched; stools thin and slimy; cloudy urine which contains trace of albumin, pus cells, bladder epithelium and masses of bacteria.

Two days later child marasmic, tremor of lower jaw, faint appearance (the condition simulates either typhoid or meningitis). The mucus of stools shows many pus cells and coli-like bacteria. Beginning otitis media. Next day child cries with strong voice. Following day slight opisthotonus, drinks badly. Next day child does not drink, lies quietly with head back, knees flexed; over both lungs light rhonchi, lips dry. Urine taken with catheter. Child cries much at night, no vomiting, no convulsions, abdomen distended. Two days afterward child drinks well, lively appearance. Two days later, great collapse and exitus.

Postmortem Findings:—

Spleen normal size, soft. Liver large and spotted. Atelectasis of lungs. Stomach and intestines swollen, injected and inflamed. Kidneys are more than three times enlarged, soft, spotted, with red and yellow portions, capsule easily stripped off. On the surfaces many yellow hemorrhagic spots, cortices widened. In cortical substance many abscesses with tenacious pus, also in medullæ and near papillæ. In pelvices hemorrhagic spots. Bladder mucosa swollen and congested, with many lentil size hemorrhagic spots. From urine, intestines, blood, and organs cultures show bacillus lactis aerogenes.

CASE No. 22. G. J., female, age three months, admitted January 9th. Small child, sent in on account of intertrigo and eczema.

Two days later patient lies with retroflexed head, no edema, slight craniotabes, coryza, maxillary, axillary and inguinal glands somewhat enlarged. Eczema on back, blisters filled with pus on left heel. Kidneys palpable, dyspeptic stools, both ears secrete pus.

Twelve days after this, large furuncle in Achilles region of left limb.

Two weeks later child somewhat improved, right ear still runs.

Two days later child worse, stools dyspeptic. Three days later urine contains much albumin, pus cells, hyalin and granular casts. Child gradually sinks and dies in a few days.

Postmortem Findings:—

Bronchopneumonic foci in both lungs, liver enlarged, kidneys enlarged, parenchymatous nephritis, obliteration in cortex with sparse abscesses. Pelvices and bladder congested and engorged.

CASE No. 80. L. B., female, two months old, admitted May 3d.

A day before admission the patient developed severe collapse, with very rapid pulse and cyanosis. The bladder extended nearly to the umbilicus. Through catheterization 100 c.cm. of a very cloudy urine was emptied. The reaction was alkaline, the sediment contained pus cells. After the administration of camphor there was some improvement; the child, however, collapses repeatedly with asphyxia and cyanosis after taking tea, and also independently of the ingestion of food.

On day of admission the child was lying unconscious with head flexed. It reacts upon pinching by moaning anxiously. The legs were flexed, skin was cyanotic and gray, respirations were flat, heart and lung sounds normal. The bladder was palpable to midway between the symphysis and umbilicus; the right kidney was more easily palpable than the left.

On next day child is somewhat better, there is still opisthotonus. It cries much, micturates three times during night, but bladder still palpable as before.

On next day child cries upon being touched, bladder as before, right ear secretes profusely. Catheterization yields 100 c.cm. of urine; bed-sore in sacral region.

Next day opisthotonus very pronounced, other findings as before.

Following day child very weak, stools thin, child sinks, exitus follows next day.

Postmortem Findings:—

Both kidneys greatly enlarged, the right more than the left, the capsules are loose. Cortices much engorged and contain numerous small abscesses of pin-head size. Pelvices dilated. Bladder wall much thickened, with rough and injected mucosa. Urethra normal. Even by severe pressure on the bladder no urine can be emptied.

CASE No. 23. M. B., female, age seven months, admitted April 27th. An emaciated, pale child, has had diarrhea, vomiting and coughing for the past two weeks. Child has rickety rosary, rhonchi over both lungs, greenish-brown dyspeptic stools.

Three days later many râles heard over both lungs. Three days after this, child in somnolent condition, coughs much, lung signs less marked. Urine reaction acid, no albumin, contains mucin and urates.

Two days later child is lively, stools remain dyspeptic for a week, then urine becomes cloudy, shows traces of albumin, many pus cells and bacterial clumps. Salol ordered.

Next day, patient very weak. Irrigations of bladder with lysol. A week later kidneys not enlarged, urine same as before, appetite bad, dyspeptic stools. Irrigations continued.

Two days later left ear and also kidney region painful on pressure. Progressive weakening and great loss of weight, with exitus after three days.

Postmortem Findings:—

Bladder greatly swollen and engorged, particularly in fundus; pelvices of kidney congested. Kidneys large, relaxed and pale-red. In cortices and pyramids many abscesses, catarrhal engorgement of bowel, follicles engorged and ulcerating foci. *Bacterium coli* grown from urine.

CASE NO. 29. E. P., male, age nine months, admitted February 16th. Small child, under weight, has had fever, vomiting and bad stools for a long time. Urine contains albumin and much pus; furuncles on neck.

Next day child vomits, both ear drums reddened. Two days later continuous vomiting, rapid loss of weight, double otitis media. After four days patient pale and thin, urine reaction acid, turbid, some albumin, many pus cells; kidney epithelium, no casts. Three days later kidneys palpable and enlarged, gradual weakening and death after two days.

Postmortem Findings:—

Kidneys show nephritis with cortical abscesses, the pelvices are severely inflamed, bladder only slightly congested.

CASE NO. 34. E. K., male, age six weeks, admitted June 20th. A slightly debilitated bottle baby, has been coughing and hoarse for past week, vomits since birth. Child is slightly cyanotic, cries much, hands and feet cold, intertrigo adnates, slight hoarseness, abdomen somewhat tense, spleen and kidneys not palpable.

Three days later, still somewhat hoarse, stools broken up and green, some blood. Three days after this sleeps much, vomits much, dyspeptic stools; two days later some coughing. Next day child laughs, no temperature, stools better.

After a week child is quiet, slight cyanosis, marasmic. Two days later crepitant râles over lungs, coughs, slimy stools; temperature 38.5°C . After three days patient declining, bad stools. Two days later patient quiet, looks very bad; temperature 39.4°C . Urine turbid, many pus cells, bladder and tailed epithelium, few granular casts, urotropin ordered. Two days later, breathing rapid, pulse small and rapid, dyspeptic stools. Next day right ear drum distended; temperature 39.5°C .; stool contains pus, urine the same. After a week child is very marasmic, dyspnea, vomiting, abdomen sunken in, skin gray-yellow, but no jaundice. Exitus.

Postmortem Findings:—

Kidneys much enlarged, congested surface, spotted with small hemorrhages. On cross section deeply red and congested, spotted streaks of pus in pyramids. Pelvices, thick fibrinous pus. Bladder hardly changed.

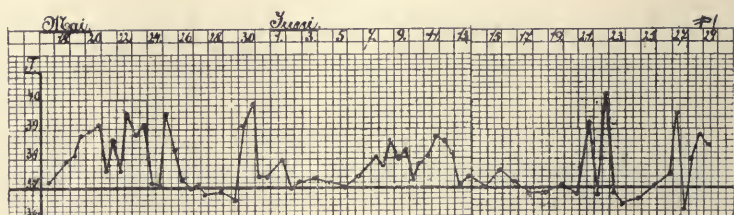
The condition may become chronic, forming permanent changes, as is shown nicely by these cases:—

CASE NO. 1. E. S., female, age three months, admitted May 14th. A well nourished and developed child is admitted with general luetic eruption, snuffles, alopecia of eyebrows, enlarged glands, and enlarged liver and spleen; temperature normal.

Six days after admission child develops temperature of 39°C ., drinks badly, and is markedly pale. The urine shows albumin, many pus cells and bladder epithelium; also many bacteria, which upon culture proved to be bacillus coli. There is little change in the child's condition for about ten days, then it becomes restless, limbs become slightly edematous, kidneys become somewhat enlarged, and urine shows, besides previous findings, some red blood cells, hyalin, pus and bacterial casts. Child's condition gradually grows worse; becomes weaker, anemic, loses weight, kidneys are distinctly palpable and hard; a distinct friction is felt over spleen.

After nearly six weeks' illness child gradually sinks, develops a cholera-like uremia with diarrhea and vomiting, and dies suddenly in collapse.

Treatment.—Urotropin and bladder irrigations of boric acid and silver nitrate solution every other day. (See Curve No. 1.)

*Postmortem Findings:—*

Mucosa of bladder and of kidney pelvices thickened and congested. Both kidneys are large, yellow and soft, and show numerous hemorrhagic foci of linseed size, cloudy swelling of parenchyma; spleen large with thick, fibrinous coating.

CASE NO. 16. M. G., female, age one year and one-half, admitted July 28th. Child markedly under weight and slight rachitis, tonsils enlarged, abdomen slightly distended, drinks well.

Four days later child developed severe pharyngitis; one week later urine contains pus cells. 0.2 urotropin three times a day. After three days child has laryngospasm.

Temperature normal three weeks, child cries much, kidneys apparently very tender, left kidney palpable; urine cloudy, albumin, many pus cells.

Day before yesterday many granulated casts were found; these are not present today.

After two days urotropin discontinued, salol, 0.1, three times a day, ordered. Five days later child more lively; urine clear, but contains many pus cells; no casts.

After one week child is still very pale, distressed, vomits and cries very much; over lungs profuse rhonchi, behind sternocleidosternal glands; kidneys palpable, urine contains much albumin, few pus cells.

Two weeks later continued bad condition, waxy appearance, anxious expression, face puffy, eats poorly, vomits much, abdomen tense, kidneys very tender; urine, amphoteric reaction, much albumin, few pus cells. Next day child develops clonic spasms, lasting half an hour. Child becomes comatose, vomits much, face distinctly puffy, no edema on body, heart action becomes irregular, pulse cannot be felt; venesection, saline infusion. Child collapses and dies following night.

Postmortem Findings:—

Heart size of child's fist. Ventricle somewhat dilated; lungs, passive hyperemia; spleen, normal; liver, normal; pancreas with-

out findings. Left kidney soft, of grey-yellow color; capsule easily stripped off; surface shows fine granulations, also many linseed size cysts. Medulla mostly grey-yellow, only a small portion shows dark-blue discoloration. The cortex and medulla not to be distinguished from one another in most places.

The blue-red discolorations appear as islands in medulla; the pelvic mucosa shows fine granulations at various points. Right kidney, soft capsule easily removed and not thickened, the surface granulations are crossed by numerous red striæ. Cysts not as numerous as in other kidney, but somewhat larger. On cross section the medullary portion shows bluish-red configurations, which shade off into grey-yellow cortex. Pelvis somewhat distended and shows granulations. Ureters on both sides red, swollen and somewhat distended.

Bladder mucosa moderately folded; on the tops of folds mucous membrane is grey-yellow, in deeper parts red. Many pin-head size hemorrhages in mucous membrane, vessels injected.

From the above we see that while this condition may only be a simple catarrhal one, readily healing under proper treatment, it may, on the other hand, be very severe and lead rapidly into either acute parenchymatous nephritis or pyelonephrosis, or may become chronic. The relation of this condition to kidney lesions is very close and practically all severe cases show at least kidney irritation, as is observed by the common presence of casts in the urine of cases of pyelocystitis. We would also like again to refer to Cases 7 and 24 in this regard.

Clinically, we distinguish two forms—the one mild, the other severe. We must, however, remember that these forms have various degrees of severity and also blend into one another.

In the mild form we find an elevation of temperature, some loss of appetite, some unrest, possibly vomiting and a peculiar pale appearance. The urine will usually show an acid reaction, some slight cloudiness, some albumin, while the sediment contains usually pus cells, bacterial clumps and some cubital or tailed epithelium. The temperature may only reach 37.7°C. (see Curve 53), or it may go somewhat higher. A tendency to higher temperatures is especially noticed in exudative diathetic children. Any or all of the symptoms may be wanting in this form, and our first attention to this condition may be called by the findings of a urinary examination.

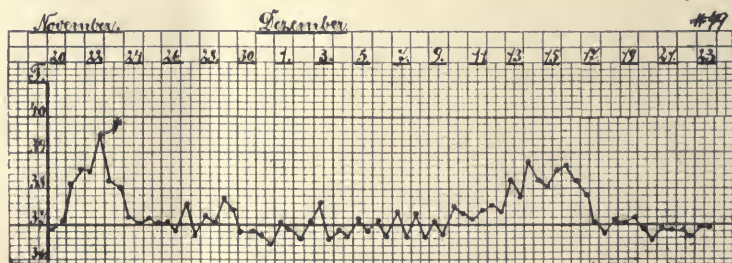
CASE No. 28, G. B., female, age three weeks, admitted

August 23d. Small, moderately developed child, with slight conjunctivitis; no rash, glands not palpable, organs normal, weight 2,850 grams. Child is nourished on the breast and progresses nicely with normal temperature until December 1st. At this time bottle is added, weight 3,800 grams. During the middle of this month child develops coryza, pharyngitis and bronchitis, with temperature, which, however, passes off rapidly and child develops nicely; gains in weight until the end of March, when the weight is 6,200 grams. Beginning of April child drinks badly, loses weight, has a pale, distressed appearance. The urine is turbid and contains many pus cells. Salol, 0.1, three times a day, is ordered. Child runs temperature and urine remains unchanged for a number of days. On the ninth of April condition is much improved, but there are still albumin and pus cells in urine. A little over three weeks after the commencement of this condition the general condition of child is good; urine is clear and remains so. Child is dismissed the first of May in good condition, weighing 6,140 grams.

CASE No. 49. Female, age three months, admitted September 10th. Small, well nourished child, skin color good, mouth, throat, navel, heart, lungs, are all normal. Abdominal walls round and soft; liver and spleen not palpable; no signs of lues. Child has bronchopneumonia in October, from which it recovers nicely.

During an epidemic of grippe toward the latter part of November child develops this condition with coryza, cough and bronchitis. On December 11th temperature gradually rises, and on the 15th child drinks badly and pus cells are found in urine. Salol, 0.2, four times a day, is ordered.

Child is again drinking well the early part of January; urine is without abnormal findings, and salol is discontinued. Child later on develops otitis media, bronchitis and pharyngitis, from all of which it make a good recovery. During all this time urine remains perfectly normal. Child is dismissed in good condition the first of March. (Note Curve No. 49.)



CASE NO. 53. A. S., female, age three weeks, admitted January 16th. Father and mother healthy, delivery normal. A slight, lively, breast-fed infant of good color, all organs normal, weight 2,700 grams.

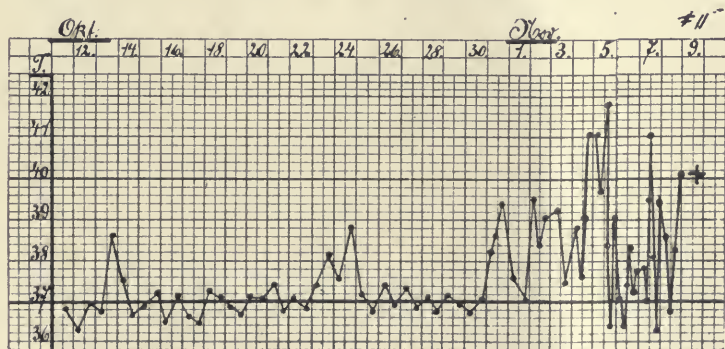
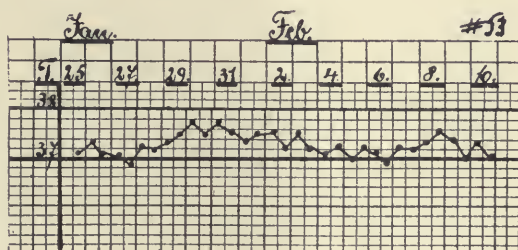
Two weeks later child runs slight temperature without symptoms; weight 2,900 grams. Catheterized urine shows in sediment, masses of pus cells; urotropin, 0.1, four times a day, is ordered. One week later weight 3,020 grams, and urine gives no abnormal findings. Child is dismissed on February 10th with weight of 3,100 grams and normal urine. (Note Curve No. 53.)

Cases of this type rarely last over two weeks and are usually much shorter in duration.

The severe type of this condition is characterized by an increase of the severity of the individual symptom mentioned under the mild type, plus other and more grave symptoms. The temperature is higher and usually lasts longer, and may either be intermittent, remittent or continuous. It may subside by lysis or crisis.

In one very severe case the temperature was always subnormal, never reaching normal. (See Curve No. 6; also, note curve following with intermittent temperature.)

There is often much restlessness and agitation which not infrequently alternate with periods of listlessness and quiet. The



loss of appetite is very prominent; this may go to the absolute refusal of any liquid.

Probably the water hunger, owing to this, gives the most characteristic picture. The paleness is more marked and the patient lies with eyes wide open and an anxious expression; they are very susceptible to touch; vomiting is usually present, and stools are generally dyspeptic. The breathing is rapid, but superficial, the pulse rapid; opisthotonus is often present, sometimes very marked. In the more severe cases jaundice is not uncommon, nor the presence of edema; there is also a tendency to hemorrhages, especially to petechiæ. Tremors and convulsions may develop; the patient often becomes soporous and even comatose. The onset is usually very sudden in this form, the kidneys usually become enlarged, palpable and tender on pressure. Shaking chills have also been noticed. The urine is the same as in the mild form, with the addition also of various forms of casts and sometimes of red blood cells. Various combinations of these symptoms form symptom-complexes which closely resemble, and which may be mistaken for, other diseases. We would like to refer again to Cases No. 4 and No. 8, and call attention to the following as examples of this form:—

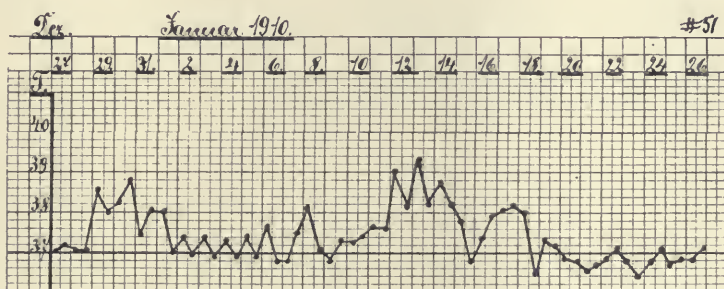
CASE No. 32. E. H., male, age four months, admitted August 3d. An emaciated and anemic child, weight 3,200 grams, ears sensitive to touch, both ears discharging, otherwise no findings. One week later child becomes very restless, appears faint and weak, drinks very poorly, stools dyspeptic, ears discharge freely; urine contains many pus cells; salol, 0.1, three times a day, ordered.

One week later small petechiæ are noticed on face and abdominal wall; still drinks very poorly. Four days later weight 3,080 grams, condition good, stool good, drinks well. Child gradually gains in weight until one month after the development of pyelocystitis; the urine finally becomes free of all morphologic structures, condition is good, weight 3,670 grams. Salol is discontinued. One month later weight 4,200 grams, condition good, urine does not show abnormal findings; dismissed.

CASE No. 51. P. S., male, age ten days, admitted October 19th. Normal delivery, parents healthy, received breast until yesterday. Pretty child, somewhat under weight, jaundice, navel moist, mouth, lungs and other organs normal; nothing for lues;

weight 2,800 grams. Child progresses nicely and without incident, gaining in weight. The end of December child develops a coryza, with bloody secretion, which proves to be diphtheria.

A week later child has serum exanthema. A few days later child drinks poorly, vomits, has dyspeptic stools, is pale, and urine contains pus cells; salol, 0.2, four times a day, ordered. Urine clears up slowly; temperature gradually falls. End of February child has otitis media, urine gives no abnormal findings. Child is dismissed middle of March in good condition. (Note Curve 51.)

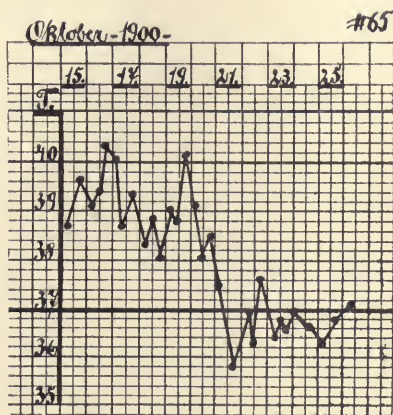


CASE NO. 65. H., female, age twenty-two months. Admitted October 14th. Weakly child, no disease preceding, sickened suddenly with fever, restless condition, poor appetite. Only some days later can urine be procured. It contains typical sediment, trace of albumin, no casts, acid reaction. Child has considerable tenesmus.

Treatment is commenced on eighth day of illness. Salol, 0.15, three times a day. Two days afterward urine cleared up; on 20th temperature sinks by crisis, urine becomes normal. Cured. (Note Curve No. 65.)

The course in this form usually runs from about ten days to three or four weeks, but may last many weeks or months. There is a tendency to relapses, both in the mild and severe type, and relapses may, at any time, give a graver symptom-complex than the original attack. The case following is an example of a moderately severe pyelocystitis, with tendency to relapses.

CASE NO. 52. H. B., male, age two and one-half weeks, admitted November 30th. Well nourished child, skin much reddened and some desquamation on abdomen, severe intertrigo on neck and between thighs, foot-soles red, and some desquamation on left one, desquamation on head, no glands palpable, the liver



and spleen not enlarged, heart and lungs normal, also pharynx. Aphthous stomatitis on front border of the lower gum; temperature normal, weight 3,900 grams, exudative diathesis. December 2d child lies in comatose condition, looks very septic, dyspeptic stools. December 3d urine cloudy, no sugar, trace of albumin; sediment contains masses of pus cells, few hyalin and granular casts.

Salol, 0.1, four times a day, ordered. December 7th urine still contains many pus cells. December 17th salol discontinued. December 21st urine contains few pus cells and epithelium. December 29th urine clear, no abnormal findings. January 8th temperature, many granular casts, epithelium and pus cells in urine. Salol ordered again. January 19th urine without findings. Salol discontinued. January 28th urine without findings. Child discharged in good condition on March 3d.

(Note Case No. 50 with curve which will follow.)

While the mild form occurs often, with so few symptoms as to be entirely overlooked without a urinary examination, the severe form at times resembles very closely other severe conditions. With marked toxic symptoms, this disease is at times very like an alimentary intoxication; with cough and nostril breathing we may think of a pneumonia; with opisthotonus, tremors and disturbances of consciousness the picture is not unlike meningitis; with an intermittent temperature, and particularly where there are shaking chills, malaria may be thought of; and, finally, the paleness, quietness, listlessness, and susceptibility to touch may remind very forcibly of Morbus Barlow. A careful urinary examination will always clear up any doubt and assure the diagnosis.

The mild type, as a rule, yields readily to treatment, and clears up in a very short space. In fact, there are probably a number of cases of this form that are not diagnosed and heal spontaneously.

Far different, however, is it in the severe form; here the prognosis is always questionable. On the one hand, quite a number of cases lead rapidly into fatal nephritides, some to sepsis; while, on the other hand, the not fatal cases show a marked tendency to recurrences and there are some cases which become chronic, yield to absolutely no treatment and continue with pyuria for months and years.

I would like to mention in this respect the following:—

CASE No. 70. E. L., a boy baby of two months, in whom a moderately severe pyelocystitis developed last September, after a stomatitis, and although child received over long periods salol, urotropin, sodium bicarbonate and combinations of these, and although child's general condition remained good, there has been until this time a continuous pyuria, absolutely unyielding to our treatment.

The two indications in treatment, so clearly described by Göppert,* are the bringing of water into the system and the giving of certain urinary antiseptics.

The flushing of the urinary apparatus and the overcoming of the water hunger, if the child will drink large quantities of water, can be accomplished readily. However, this is often not the case, and we must either use for this purpose the stomach tube, as advised by Göppert, or, as preferred at this institution, the giving of rectal enemata of Ringer's solution by the drop method, as described by Rosenstein for pylorospasm.† Marked improvement nearly always follows this procedure. The medicament found most reliable at this institution is unquestionably salol in doses of 0.1 to 0.2 three to four times daily.

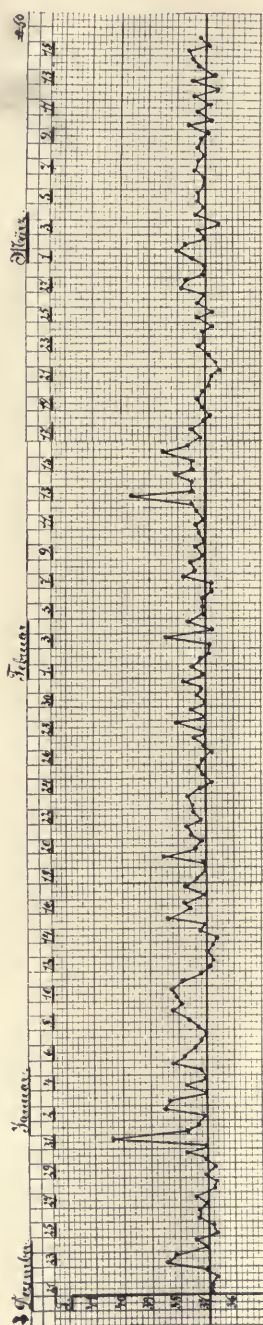
In only 2 cases where this did not prove satisfactory did urotropin give better results, while salol had to be substituted for urotropin numerous times before results were obtained.

The 2 following cases are of interest in regard to treatment:—

CASE No. 61. F. O., male, age one month. August 8th developed suddenly a very severe pyelocystitis without any predisposing cause, he having been under careful observation. The very threatening symptoms yielded nicely to rectal instillations, but a chronic pyuria with varying temperatures continued until December 1st. The urine, which at first was acid, became alkaline and

* See previous reference.

† "Rektalinstillationen bei Pylorospasmus," J. Rosenstein. *Deutsche Med. Woch.*, No. 1, 1910.



remained so. Salol was given almost continuously during this period. Within ten days after the substitution of urotropin, 0.25, three times a day, the urine cleared up, temperature became better and color gradually improved. Child made an uneventful recovery.

CASE No. 50. R. K., male, age five months. Admitted December 16th. Rather weakly child, coughs, pharynx and tonsils inflamed (pharyngitis), lungs normal, no palpable glands, spleen not palpable, no sign of lues, dyspeptic stools. December 17th, pharyngitis, stool good; December 20th, pharyngitis continues, stool good; December 23d, child drinks poorly, urine cloudy, albumin positive, many pus cells. Salol, 0.2, three times a day, ordered. January 2d, few dry rhonchi over lungs, abdomen much distended, dyspeptic stool, pulse 144; January 10th, condition of urine same as before; albumin, many pus cells, bacilli, no casts. Salol discontinued; urotropin, 0.25, four times a day, ordered. January 24th, condition of urine unchanged, bicarbonate of soda added. March 13th, urine has at last cleared up, gives no abnormal findings and remains so. Child dismissed on March 17th. (Note Curve No. 50 here.)

From the fact that we consider the condition nearly always a pyelocystitis, and also from lack of results at this institution by irrigations, we cannot recommend irrigations of the bladder. Until now, serum treatment in children has not proved satisfactory, according to the reports of several authors.

In closing, we wish to emphasize the commonness of this condition, not only

in female infants, but also in males; that both the bladder and pelvices of the kidney are usually involved, and, finally, that the systematic examination of the urine of infants is not only necessary, but will, in many instances, relieve the physician of much doubt and worry and lead to the relief of much suffering in many babies and also to the saving of many lives.

THE PROPHYLAXIS OF ACUTE ANTERIOR POLIOMYELITIS.—Römer and Joseph (*Münch. med. Woch.*, May 3, 1910) say that in discussing the prophylaxis of such a disease as poliomyelitis one must consider two forms of prophylaxis—hygienic and medicinal, especially etiologically specific treatment. The latter may be preventive or curative. In hygienic prophylaxis domestic animals, as dogs and chickens, must be considered as possible carriers. Another point of importance is the probable part played by human beings as disseminators of the disease. In many ways the mode of transmission seems to be similar to that of meningitis. It has been suggested that the virus is present in the nasal and pharyngeal secretions, both of those suffering from the disease in its abortive or complete form and in the clinically healthy. Contact with secretions from such persons may cause infection. Experiments have shown that the virus remains virulent, and apparently actively virulent, after twenty-eight days of drying. It may, therefore, be transmitted through dust. The authors have exposed the virus to fumes of formaldehyde in a room by the usual disinfection methods and have shown that after seven and a half hours the virus when injected into a monkey was inert; that the usual formaldehyde disinfection destroyed the virus. It is urged that disinfection should be carried out in a room which has held a patient. Careful disinfection of the nose and mouth of patients and all exposed to them is advised, to prevent the danger of carriers. The discovery that one attack renders an animal immune to a second infection, and that the serum of an immune animal protects a normal one, holds out hope for the production of an immunizing serum.—*Medical Record.*

COLON INFECTIONS OF THE URINARY TRACT IN CHILDREN.

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Although the diagnosis of colon bacillus infection of the urinary tract can simply and exactly be made, hardly any other common affection that occurs in childhood is so often overlooked.

More than ten years ago Ashby, of Manchester, laid down the axiom that, confronted by persisting obscure fever, pediatricists must never forget a possible pyelitis or cystitis. Escherich, in 1890, reported a series of 7 cases in a paper wherein he discussed the causation, pathology and symptoms of this condition very much as did Morse in his recent illuminating article published in the *American Journal of Medical Sciences*. During the intervening years many German, French and English writers have dealt with the affection as it occurs in adults, but few authors have dwelt on the special features of this condition as it occurs in children. The malady, then, is not rare; it has been recognized, studied and reported upon by many competent observers.

Why, then, is the diagnosis so infrequently made? The answer to this question is based on the fact that the symptoms are protean, and often are not referable to the urinary tract, and on the further fact that routine examinations of the urine, as usually practiced, will not reveal colon bacilluria. The diagnosis can only be reached by a cultural examination of the urine. Commonly, this is found to be highly acid and cloudy and may best be described as looking like a bouillon culture of typhoid or colon bacilli. In very marked cases where a large quantity of pus is being excreted there may be a purulent sediment, but this is not common. Under the lens the appearance of the urinary sediment varies. Without pus cells there may be a large number of motile gram negative bacilli responding to the cultural tests characterizing the colon bacilli, or pus may be present in small or large quantity, or if the kidney be involved tube casts may be seen.

The colon bacillus may reach the urinary tract by any one of three ways: (1) By ascending the urethra, (2) from the blood stream, (3) directly by contamination from rectum to bladder when the pelvis is inflamed. The latter may be, and probably is, a common result in post partum colon cystitis and in the colon cystitis of old men with enlarged prostate glands. Wreden, in 1893, by injuring the rectum of rabbits, produced such a colon cystitis. Infection by the second route will result in multiple abscesses with pyelitis or in simple pyelitis, the bladder becoming infected by the descent of the bacilli; in adults this route of infection gives rise to a common type of surgical kidney, first described by Barnard in England and by Breuer in this country. Lindberg in 1889, showed that when the infection is from the blood stream the septic infarcts in the kidney are interlobular and that their apices terminate between the pyramids, while the infarcts that follow ascending infections are intralobular, the apex of each passing into the renal pyramid.

In children, hematogenous infection with simple pyelitis may follow fissure in ano, a very common but often overlooked condition in constipated babies. However, in childhood, by far the greatest number of infections are of the ascending variety; in young female infants these frequently follow the careless cleaning process employed by many nurses. Another cause of infection in girl babies is the out-grown, too tight diaper, which may force fecal matter past the vulva of the child. As a point of prophylaxis, mothers attending the Cooper Clinic are instructed always to clean the soiled buttocks of the child in a direction away from the vulva.

A large proportion of Morse's cases happened in boys, but we have encountered the condition only in girl babies, although for some years we have been on the lookout for colon cystitis in boys. The symptoms in this condition vary so greatly in different cases that the observer soon comes to recognize several clinical types, each characteristic. These types range from persistent bacilluria, discovered only on routine examination of the urine, to acute infections simulating typhoid or meningitis. Intermediate in severity range cases of enuresis, cystitis and pyelitis. Fever may range from a hardly noticeable elevation to hyperpyrexia. In some cases the type of fever is continuous; in others it ranges with variations like those seen in septic infections. Leukocytosis is the rule, but it, too, is variable. The highest number

of white cells we have seen was 37,000 to the c.cm., but often, especially in the enuresis cases, the white count reveals not more than 12,000 to 14,000.

The simplest form of infection, commoner in older childhood than in infancy, is that in which there is only a true bacilluria. By that term is not meant such a condition as occurs in typhoid fever when the body excretes myriads of bacteria through the urine, but one in which the urine actually becomes a medium for the growth of bacilli. These cases may give no suggestive symptoms; frequently, however, they are accompanied by slight malnutrition and anemia. The condition may last for years, and remain undiscovered until a careful microscopic examination and culture of the urine is done in an endeavor to decide the cause of malnutrition. Such cases are frequent enough to make a routine culture of the urine necessary in pediatric practice. In this group of infections come those in which incontinence of urine is the only symptom. Fifteen cases of enuresis were seen at the Cooper Medical College last year, and one-fifth of that number was due to a colon bacilluria.

Louisa S., age five and one-half years. Previous history no bearing; child sent into clinic from Eureka for diagnosis. For one year had had nocturnal enuresis. Examination negative. Culture of urine showed colon bacilluria. Treatment advised, vaccination.

Helen C., age five years. Child has had diurnal and nocturnal enuresis since birth. On some days while awake she can control urination, but it is very frequent. White blood corpuscles, 15,000. Temperature, normal. Examination reveals purulent vaginal discharge which shows colon bacilli. Urine culture likewise shows pure growth of colon bacilli. Urotropin, gr. xv, was given daily, and the symptoms of incontinence gradually improved, so that in one month they had entirely disappeared. Colon bacilli persisted, however, and an autogenous vaccine was prepared, 25,000,000 given every four days, gradually increasing to 50,000,000. This was continued for two months, and although there was no return of the symptoms the bacilluria persisted. Since then the patient has again been put upon vaccine treatment, being given 75,000,000 every two days. The urine is much clearer, though still infected. The diurnal enuresis has disappeared; the nocturnal, however, persists.

These cases show the importance of culturing the urine in

every case of enuresis. The results of treatment certainly make the extra effort worth while.

The next group of cases includes those in which the infection is a trifle more severe, and although the course is a subacute or chronic one, there is definite evidence of an inflammatory condition of urinary apparatus. This is the type of infection common in nurslings.

In small babies the first symptom may be pallor and failure to gain weight. There is in some cases paroxysmal crying. There is an increasing rise in temperature, usually quite slight. In the urine are found motile bacilli, and more or less abundant pus cells. The most interesting symptoms connected with this condition are those referable to the gastrointestinal tract. The babies develop anorexia. They may vomit occasionally. The stools are numerous, greenish in color, and contain mucus. This is usually the initial condition, and later constipation is present. It is these gastrointestinal symptoms that so often mask the underlying condition, and these children are often subjected to weeks of treatment for colitis when the bowel condition is secondary to that of the urinary tract.

Baby eight months old. The child was presented on account of what mother described as an attack of "summer complaint," coming on gradually two weeks before with frequent green stools containing mucus. Previous history was without bearing. The patient was treated in the usual way for the supposed attack of colitis. On the following day the nurse reported pus on napkin. White blood corpuscles, 18,000. The genitalia were examined and no vaginitis was found. The patient was then catheterized and the urine found to be highly acid and cloudy. A culture revealed the presence of colon bacilli. In eight weeks the bacilli disappeared from the urine and the intestinal symptoms cleared up. The child was given 10 grains of urotropin each twenty-four hours. This was dissolved in the pint of water used in making up the food mixture.

Baby B., age two years. Birth and development normal. The present illness dates from the seventh month. In October, 1908, she had an attack characterized by marked fretfulness, fever and green stools. There was a brownish sediment in the napkin. Urination apparently normal. The urine is reported as having been very acid. No pus or albumin found. Urine was not cultured. From subsequent history it seems reasonably certain that

had it been cultured colon bacilli would have been found. From this attack until September, 1909, child had numerous attacks of this kind with deposits on the napkins and high acidity, and between these there would be remissions when she was apparently well. In September, 1908, following a relapse, because each one of these subsequent attacks may be called a relapse, the urine was cultured and a colon bacillus infection discovered. A stock vaccine was injected at first in small doses—1,000,000 up to 10,000,000. No improvement followed this treatment and the dose was increased to 20,000,000 every four days. Urotropin was also given, gr. xv daily. For six months urine has been free from colon bacilli.

In the third group may be considered those severe cases of urinary infection in which the symptoms are referable to toxemia and gastrointestinal disturbance. Here, as in the group previously mentioned, the gastrointestinal symptoms are frequently in the foreground and the child presents a fairly typical picture of an intestinal intoxication. These cases may develop in two ways. Either the diarrhea comes on at the onset coincident with the fever, or the child will be sick several days with perplexing symptoms of toxemia, which are apparently explained when the signs of an acute colitis appear. These intestinal symptoms, so often present with urinary infections, bring up the very important question as to whether the intestinal condition is primary or secondary. Hutinel, *Presse Medicale*, 1896, reports a series of cases and attributes the urinary infection to a primary enterocolitis. He says that the congestion of the lower bowel produces congestion of the bladder, that diarrhea causes a very small quantity of urine to be secreted, and that the stagnant urine in a congested bladder is an excellent culture medium. It is certain, however, that some other element must play a rôle, because while colon bacilli infections of the urinary tract are by no means uncommon, still they are very rare as compared with the cases of enterocolitis during the first few years of life. Furthermore, in this climate where the severe intestinal conditions are fortunately rare, urinary infections are quite common. The bladder symptoms may be present in these cases, and then, of course, the diagnosis is more easily made.

Baby, female, age eight months. Breast-fed for three months; birth normal; development normal; one week before patient was seen she developed a slight diarrhea. Then began apparently to have some pain on urination, evidenced by crying. The urine was not

examined at that time, and under catharsis and a bland diet the symptoms subsided and remained in abeyance for several weeks. Then the child suddenly developed a high temperature and began to cry. The crying was not related to urination. Mother now discovered a purulent vaginal discharge. The urine on culture showed colon bacilli. This patient was also given urotropin and the symptoms persisted for four weeks after treatment was begun.

Baby, age five months. Bottle fed. History of constipation. The child was brought to the clinic on May 26th with history of progressive emaciation and restlessness. The diet was regulated. Its general condition improved. On June 23d brought in with history of having been suddenly taken ill during the night. Temperature, 104°F. White blood corpuscles, 17,800. The bowels were loose and the stool contained much mucus. Admitted to hospital. Physical examination negative. Symptoms did not abate in three days, and catheterized specimen of urine showed a pure growth of colon bacilli. Urotropin was given, gr. xv daily, and in two weeks patient was discharged much improved, but with colon bacilli still present in the urine. They persisted until October 10th, four months. During that time mother frequently brought the baby in suffering from acute colicky pain that she described as cramps. It is probable that these were due to an ulceration of the ureter, the contraction of which caused the pain. Zahorsky has reported such a case in which autopsy showed ulceration in the ureter.

The so-called typhoidal type of urinary infection constitutes the fourth class of cases. In these cases, which usually occur in older children, the infection comes on acutely, with a marked rise of temperature which continues high and which is typical neither of typhoid nor of sepsis, but is irregularly high. The symptoms are purely those of toxemia. Such children are apt to lose their appetites and to act and to look very ill. There is no symptom that suggests urinary infection, and such patients are sometimes treated for weeks before the diagnosis is made. A very interesting feature of these cases is the fact that after the children have been ill for several weeks the blood serum in high dilutions will agglutinate typhoid bacilli. Shaw, in the *Clinical Journal*, 1908, reports several cases of this type, in which during the fourth week of the disease a positive Widal reaction was obtained with dilutions of 1-30 or 1-50, but not 1-100.

R. L., age eight years. Previous history negative. Always healthy up to summer of 1909. Since then has been languid and pale. In November, 1909, she was suddenly taken ill with headache, vomiting, and temperature 104°F . This temperature continued irregularly high, between 99° and 104°F ., and on December 15th urinalysis revealed presence of pus and colon bacilli. The white blood count varied from 17,000 to 30,000, with an average of 75 per cent. polymorphonuclear cells. Alkaline treatment prescribed. Potassium citrate given according to Morse's suggestion without improvement. On December 23d 25,000,000 dead colon bacilli in autogenous vaccine were injected and afterward at intervals of four days; injections were given gradually, increasing the number of bacteria to 50,000,000. The urine became sterile and remained so. Fourteen injections were given in all.

Mamie C., eight years of age. Previous history no bearing. Child was taken acutely ill two weeks before entrance to hospital, with high temperature and malaise. When first seen she was markedly prostrated with temperature of 104°F . Leukocytes, 21,000. Widal, negative. Physical examination otherwise negative. Blood culture negative. Urine was examined and cultured and pus casts were seen under the microscope and colon bacilli were found in pure culture. The child was given urotropin, gr. xx daily, and a bland diet. She improved gradually and left hospital in three weeks, then was lost trace of. The urine was still infected when last examined.

H. S., female, age three years. The previous history has no bearing. Four months ago child was suddenly taken sick with high temperature and malaise. Anorexia without bowel disturbance. No symptoms pointing to involvement of urinary tract. Typhoid fever was diagnosed and the child was confined to bed for six weeks on a milk diet. At the end of this time the child was sent out of town, although irregular fever persisted. The diagnosis was then changed to general miliary tuberculosis. The symptoms continued without improvement. The child was first seen by one of us four months after onset of attack, at which time patient had a temperature of 105°F . Physical examination revealed a poorly-nourished child of three years and was otherwise negative. White blood corpuscles, 16,000. A specimen of urine was examined and a large number of motile bacilli and pus were found. A culture of the urine showed a pure growth of colon bacilli. The patient was given urotropin, gr. xv daily. In

two weeks the fever subsided, and in four weeks the urine became free from bacilli.

The last group of cases includes those in which the symptoms are referable directly to the urinary tract. They may begin with frequent and painful urination and a sharp rise of temperature, and may subside here or may go on and in two or three days show decided involvement of the kidney with pain in the lumbar region and the presence of a tumor mass. These are usually surgical cases, but they may recover under conservative treatment. The general symptoms are those of a severe intoxication.

E. G., age six months. Pale, restless baby in evident distress; breathing 60 per minute; clinical picture suggestive of lobar pneumonia, but no physical signs can be elicited; temperature when admitted to hospital 104.6°F.; lungs normal; with exception of rapid action, heart normal; considerable distention of abdomen; over the right flank in the kidney region a palpable mass, which was taken to be either an enlarged tender kidney or perinephritic abscess; liver hard, extending almost to the umbilicus; spleen three fingers' breadths below left costal margin, with hard edge; on passage of a catheter several ounces of cloudy, very acid urine were withdrawn, which showed many pus cells; culture showed pure growth of colon bacilli; at this time blood count showed 16,800 white cells to the cubic centimeter, of which 78 per cent. were polymorphonuclear; child was given 10 grains of urotropin daily, dissolved in the water used for diluting its milk mixture; temperature was unaffected for one week; then began to fall steadily, and on the eighteenth day reached normal, and from that time on child's condition improved; child left hospital on fortieth day, urine having on two separate occasions proven to be normal in acidity, clear, without pus, and perfectly sterile.

The diagnosis of this condition is made most difficult, because the symptoms in any case may vary from time to time. A child may have so slight a urinary irritation that it fails to impress the parent, and yet in a few days a typhoidal state may appear which masks the true condition. Furthermore, mothers often consider frequent urination to be due to what they call "cold in the bladder," and a medical man is summoned only when the child develops a severe diarrhea, which does not yield to household remedies and the original "cold in the bladder" is meanwhile forgotten.

Any of the acute urinary infections may start in with symptoms referable to the cerebrospinal meninges and rigidity of the

back of the neck is not uncommon, and these cases are one more cause of that very interesting condition, meningism, that Dupre first described. F. Göppert, in the *Berlin. Klin. Woch.*, 1909, reports several cases of this type, and also emphasizes the fact that sometimes several examinations of the urine must be made before an accurate conclusion can be reached.

Some of the chronic cases of urinary infection by colon bacillus put themselves into evidence by a group of symptoms very like the symptoms complex described as recurrent vomiting in children. Such a case was that of H. H., aged four, whose mother stated that at intervals of from six weeks to two months the child was attacked by a fever, sometimes as high as 105° F., vomiting and constipation. At first the vomiting would be food, then bile-stained fluid, and later anything that has been ingested. There was a good deal of retching when the stomach was empty. It was noted that the breath was of a heavy sweetish odor. The attacks were often accompanied by eruptions of urticaria and the mother noted that the urine was very irritating before the onset of these attacks. After the attack had subsided, during a course of a week or two, the child would have marked nocturnal and diurnal enuresis. She had had five such attacks when she was first seen by one of us. The general examination revealed nothing of interest. A catheterized specimen of urine contained a few pus cells, very many motile gram negative bacteria, which gave the cultural test for colon bacillus. This child responded very promptly to bicarbonate of soda, 5 grains every three hours, given in a wine glass full of rather strong lemonade.

We have had one other similar case in our series. In light of the more recent views of the etiology of recurrent vomiting, which would assign a toxemia arising from chronic appendicitis or chronic tonsillitis as responsible for the symptomology, we feel that it is not unreasonable to call attention to the possibility of colon bacillus infection of the genitourinary apparatus as a source of toxemia, which may express itself in a picture very much like that of chronic recurrent vomiting.

It is fitting to describe here in detail the method of obtaining and culturing the urine for examination, because it is only by culture that an accurate diagnosis of the offending organism can be made. If one has the patient where a microscope is convenient, an immediate examination of the urine as quickly as it is passed with the high power dry objective, will reveal the presence of

many motile bacilli, which in over 87 per cent. of cases are colon bacilli. Specimens of urine for culture are best obtained as follows: In boys the urethra is cleansed as thoroughly as possible with bichloride solution, 1-2,000, and afterward with sterile water and the child instructed to urinate in a sterile basin or flask, and from this an agar tube is inoculated. In girls the external genitals are similarly cleansed, a small rubber catheter is passed, and an agar tube inoculated directly. Recently, one of us, on account of the unpleasantness incidental to catheterization, especially in older girls, has instructed the nurses after preliminary cleansing of the vulva to allow the patient to urinate into a sterile basin. During the process of urination the labia are held apart and every precaution is made to protect the urine from external contamination.

In the short time allowed for this paper no attempt will be made to discuss the different conditions with which the colon bacillus infection of the urinary tract may be confused, because a careful examination of urine removes all possibility of confusion. It will be well, though, to mention the fact that if a urinary examination is not made enterocolitis, typhoid, malaria, general miliary tuberculosis and meningitis may be simulated by this interesting condition.

The prognosis for life in these cases is usually good. Of course, in some rare cases of marked infection of the kidney with multiple renal abscesses a fatal result may ensue. Concerning the cure, however, the prognosis must be very guarded. The symptoms may clear up promptly and yet a bacilluria with malnutrition persist. Again the bacilli may disappear completely from the urine only to reappear in a short time. Zahorsky, *Pediatrics*, 1908, points out that in children who have had a colon bacillus infection of the urinary tract with apparent cure, there is great tendency for the bacilli to reappear during some intercurrent acute infectious disease. Briscoe, in *Lancet*, October, 1908, reports a very interesting case of postural albuminuria, in which, on those days when marked headache and malaise afflicted the patient, the urine showed the presence of colon bacilli.

Finally, it may be said that the infection of the urinary tract with colon bacilli may last from several days to several months, or even years, in spite of any form of treatment, and that the cases are very prone to relapses.

Prophylaxis must be briefly described, and again reference will be made to great cleanliness of the genitals. It is said that in boys

with phimosis circumcision may cause the bacilluria to disappear completely without further treatment. Removal of oxyurides from the bowel likewise often relieves the bacilluria. If the attack is acute the child should be put to bed and be given large quantities of fluid to flush the bladder, at the same time the bowels should be thoroughly moved. In addition to that, 15 grains of urotropin should be given daily. This should be diluted in a large quantity of water. The use of the alkalies has been recommended, especially by Morse, who, unlike the writers, finds them more effective than urotropin. But, in the more intense, persistent cases autogenous vaccines give us our only hope. The method of using the vaccines will, of course, depend on the experience and judgment of the individual practitioner. Leary (*Boston Medical and Surgical Journal*, 1909) claims his best results to have followed small doses of the vaccine at short intervals. Thomas, of Philadelphia, in a late number of the *Journal of the American Medical Association*, reports a series of cases in which good results have followed enormous doses at three and four day intervals. The latter is certainly the least distressing method to the patient. In most of the cases reported that have been given vaccines, this method has been employed, and it has seemed rational to inject the largest dose that can be given without producing a marked reaction and to repeat the injection at four day intervals.

In the chronic cases of infection, those that show only malnutrition and incontinence with or without a slight temperature rise, the patients should be similarly treated, although they need not be confined to bed. They should be encouraged to drink freely of water and to rest content with a bland, nourishing diet. All methods that tend to improve the general condition should be employed. Anticolon serum used by Dudgeon and others has not been successful.

In concluding, special attention should be called to the importance of culturing the urine in all cases of persistent fever of obscure origin, because this simple procedure will often clear up the diagnosis of a puzzling case.

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THE ORTHOPEDIC TREATMENT OF SPINAL PARALYSIS.*

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The treatment of the acute stage of poliomyelitis has hitherto been exclusively within the domain of internal medicine. Observations which we made in the year 1909 appear, however, to indicate that orthopedics may also participate with success in the treatment of this stage.

We found that children ill with poliomyelitis, and suffering severe pain in the spinal column, became free from pain on the application of a plaster-of-Paris jacket, which embraced the entire trunk exactly like a jacket for spondylitis, and held the spinal column still and at rest.

The suggestion for immobilizing the spinal column of a child in the acute stage of poliomyelitis was first made by Oppenheim. As far as I know, however, orthopedic appliances have not been previously used for this purpose, but the children have been kept flat in bed, or at most supported by pillows to keep them from much moving.

If it is clinically true that the acute stage of poliomyelitis requires the spinal column to be held rigidly and at rest, then it is clear that more is to be accomplished by careful fixation in an orthopedic jacket or an orthopedic bed than by simply lying in bed.

For we must try, when a child is acutely ill with poliomyelitis, to prevent and limit, as far as possible, the extension of the inflammatory process in the spinal cord.

I myself think that at present we can rely less on internal remedies or on hydrotherapeutic measures than on orthopedic fixation of the spinal column. All the experience we have had in other acute inflammations indicates that the keeping of the affected parts at rest is the most important requirement for a speedy recovery.

I should like, therefore, in your country, where in recent years you have been visited by such epidemics of poliomyelitis, to earnestly recommend in the acute stage the immediate fixation of the trunk in an orthopedic bed or by a plaster-of-Paris jacket.

When the acute stage is passed and the losses which the inflammation in the spinal column has produced can be reviewed,

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namely, the inability of the patient to move, then a second task devolves upon the orthopedist, which is to assist, as far as possible, the restoration of the paralyzed muscles and to prevent the occurrence of the contractions. For a year after the beginning of the illness the possibility still exists that the paralyzed muscle will recover and therefore, we must do all we can in the first year to assist this recovery.

It is well known that we can favorably influence the nourishment of an affected muscle and the circulation of the blood in it by the application of electric currents, by massage, and by air and water baths of the most varied kinds. I have nothing new to tell you about that, only I should like to warn you against a rough, hard massage and, above all, against a deep, firm, stroking massage. When you reflect how soft and tender the muscle paralyzed by poliomyelitis is, you will acknowledge that we must be very careful in handling such a delicate structure. Just as it is possible by a powerful massage to remove fat on an undesirable part of the body, so can we, I am convinced, weaken and injure a paralyzed muscle by a rough massage, instead of strengthening it, as is our object and intention.

The prevention of contractions makes the application of orthopedic apparatus necessary, but we must be careful not to overdo a good thing. Normal muscle may be injured and weakened, as we see every day, by the pressure of any orthopedic apparatus and consequently fall into a partial atrophy. The paralyzed muscle is still more sensitive to pressure than is the healthy, and, therefore, we must limit the application of orthopedic splints as much as possible both with respect to the length of the time they are worn and to the weight of the apparatus. My method will best be made clear by some examples.

If I have determined in a little patient with poliomyelitis that there is a paralysis of the tibialis anticus and posticus, then I know there is danger that in a short time, though using the lame foot, a bad pronated flatfoot (*pes planovalgus*) will occur. To prevent the occurrence of such a deformity I do not use a large apparatus, as, for instance, a Hessing splint, for it is precisely these forms of apparatus which cause the greatest atrophy of the muscle, but I content myself with a celluloid support, reinforced with steel wires, which brings the foot into a relative supinated position and prevents the sinking of the arch of the foot. For use during the night I order an internal splint of similar constitution, which

fixes the foot in a stronger supinated position and relieves a shortening of the pronating muscles which possibly may have taken place during the day; this stiff shell is without lacing and avoids all pressure on the paralyzed muscles.

I proceed in a similar manner in paralysis of the other muscles, the extensor digitorum and the peronei. Here there is danger that a club-foot will occur; to prevent this I have used during the day a support similarly made of celluloid, reinforced with steel wire, which presents an oblique plane sloping from without inward, and which with every step inclines the foot toward a pronated position. During the night I employ an outside splint of similar constitution which holds the foot in a pronated position.

In a case of paralysis of the dorsal flexors I have used during the night a splint which forces the foot into an extreme pes talus position and powerfully stretches the Achilles tendon, which is strongly inclined to contract. During the day I also avoid cumbersome apparatus with these children. I restrict myself to putting a small splint into the back of the shoe, which prevents the sinking of the foot beyond 90° and thereby makes the over-extension of the paralyzed dorsal flexors impossible.

If the gastrocnemius is paralyzed I take care that the foot is fixed in an extreme equinus position during the night. For the day I employ only a plate, which brings the foot into a slightly supinated position and thereby counteracts the inclination to pronation.

In paralysis of the quadriceps I also avoid apparatus during the day as far as possible. If the children are able to walk notwithstanding their paralysis, I simply let them use their legs without any artificial support. If there is a tendency to deformation of the knee, whether it be a genu valgum or a recurvatum, I restrict myself to the use of a night splint which fixes the leg in the opposite position. Only when the children are unable to walk without an apparatus do I support the paralyzed limb with either a short celluloid splint, or with the usual steel truss-belt apparatus. I also avoid here the laced leather case, because it causes a much greater atrophy of the muscles than the old belt apparatus.

If you begin early with the orthopedic treatment and carry it out consistently you will help the patients very much, and you will, as a rule, be able to prevent contractions. Even in case of paralysis of the tibialis anticus and posticus, where the burden of the weight of the body extraordinarily favors the formation of a

pronated flatfoot, you can by these means certainly prevent the formation of a deformity, as I know from many years' experience.

There are patients who are so well satisfied with the result of this simple treatment that they do not want anything further and prefer to continue it during their lives rather than to submit to an operation. The majority of the sufferers, however, sooner or later want to be relieved, if possible, from the apparatus which makes them dependent upon the doctor and the instrument-maker. For this purpose we have several procedures: Redressment with or without tenotomy, transplantation of the nerves, arthrodesis, and transplantation of the tendons.

Redressment is always necessary as a preliminary operation when the patient first comes under treatment, when a contraction has taken place. On this point all the authors agree. Lorenz, in Vienna, goes still further. He thinks that in most cases a redressment is sufficient and that in a paralytic club-foot nothing further is necessary than tenotomy, redressment, and a plaster-of-Paris cast for two months.

My experience in this particular direction, especially since the era of tendon transplantation, is to the contrary. In most paralytic deformities, if you restrict yourself to redressment, you get sooner or later a relapse of the deformity. An exception to this is seen in those deformities, above all certain bad cases of equinus, in which single muscles which were temporarily paralyzed by poliomyelitis recover in a quarter of a year or in half a year after the illness; notwithstanding this they are generally not able to raise the foot, because in the meantime a severe equinus and such a stiff contraction of the Achilles tendon have developed that the overspanned and weakened dorsal flexors are powerless against them. However, if you remove these difficulties by tenotomy and redressment and give the paralyzed dorsal flexors an opportunity to shrink and contract by fixing the foot for a sufficient time in a pes talus position, they can afterward raise the foot again in an approximately normal way. In such cases I do not transplant the tendons, but restrict myself to redressment. I think, however, that this method of treatment, according to Lorenz's recommendation, will not be successful, as a rule, in cases of paralytic deformities, but rather that it will generally be necessary to repair the loss of the paralyzed muscle by a second operation.

Three methods are at our disposal. I shall begin with the newest operation, nerve plastic.

If we had the same results with our poliomyelitic patients in nerve plastic as we have in our experiments on animals, then nerve plastic would without doubt be the operation which would best solve the problem of conducting new power to the paralyzed muscles. That nerve plastic can achieve good results in men is proved by observation in cases of facial paralysis, but a result entirely free from objection in the case of a poliomyelitic patient I have myself not yet seen.

If the muscles are given an opportunity to shrink, whether it be by operative shortening or by a long application of connecting apparatus or bandages, then the result attained may be due to those measures and the transplantation of the nerves may perhaps have been an entirely superfluous operation. I have, as I have said, neither among my own patients nor among those operated on by other physicians so far seen undoubted success. I also think that those peripheral paralyses in which there soon occurs a degenerative reaction and the destruction of the nerve-end apparatus in the muscle, and by which finally the whole muscle suffers more or less fatty degeneration, are not proper subjects for nerve plastic. Nerve plastic in a degenerated muscle is always without result, as its warmest advocate, my colleague Spitzzy, acknowledges. If you resort to nerve plastic in a case of spinal paralysis before degeneration has set in and see later that the muscle works, it is still no proof that the nerve plastic has been of service, for in the first months a paralysis can spontaneously disappear.

These observations and reflections make me at present still reserved with respect to nerve plastic. I should be very glad if we could attain in this way an ideal cure of our paralyzed patients, but the results hitherto achieved unfortunately do not seem to furnish sufficient ground for such a hope.

I now turn to arthrodesis. It is unpleasant to be obliged to stiffen a joint, to sacrifice a function of the body. Circumstances, however, often compel us to do it and when by such an operation we attain a greater ability to walk, we may not ask whether we like the operation or not. In case of the complete paralysis of the muscle of the lower leg and foot arthrodesis can be a great blessing, because the instability of the talo-crural and talo-calcaneus joint, and in severe cases also of the joints of the fore part of the foot, is done away with. In cases of this character I perform an arthrodesis of the foot. As a rule, however, I do not

operate before the fourteenth year; as too early operation reduces the prospect of bony union of the joint surfaces and favors a relapse of the deformity.

The fixation of the foot by the operation greatly facilitates walking on level, smooth ground, but the patients are often very much hindered by the stiffness in walking on uneven, hilly ground, because the stiff foot cannot adapt itself to the irregularities of the surface of the ground; the success of the operation is thus impaired. In the room the patients can walk better with their arthrodesed feet than before with tottering ones. Out of doors and in walking for a long time the foot after the arthrodesis often gives out sooner than before the operation. This experience induces me to seek another operation which would retain the movement of the foot to 90° and only make the dangerous and annoying sinking of the point of the foot beyond 90° impossible.

At first I sought to attain this by puckering and shortening the dorsal flexors. The success of this method is at first very good, but according to my experience does not yield permanent results in children; only in adults have I seen permanent results from shortening of the dorsal flexors. In children I have, therefore, given up the shortening of the paralyzed dorsal flexors and instead use silk to prevent the sinking of the point of the foot below 90° . The method, which I first used in the year 1903, creates in certain respects *artificial joint ligaments out of silk*. The technic is as follows: I make four small incisions—two on the median side, one over the navicular bone and the other over the tibia, 5 cm. above the joint, and two on the lateral side over the cuboid and on the fibula. I carry from the tibia to the navicular bone and from the fibula to the cuboid six to eight strong silk threads which are very securely sewed to the periosteum above and below and are passed in the middle through the deep adipose tissue over the capsule of the joint. The results of the operation are good and permanent if careful after-treatment is carried out for a year.

If all the muscles are not paralyzed, but some strong ones are well conserved, *transplantation of the tendon* takes the place of arthrodesis. The ingenious idea of using living muscles in the place of paralyzed ones in order to restore a lost function was carried out for the first time by Nicoladoni in the year 1880, but his results are said not to have been good. The surgeons who themselves collaborated in the development of the method under-

stand that very well, for the difficulties which the new method had to overcome were great. When I adopted the Nicoladonian idea in the year 1897, I was not spared disappointments. One cause of my failure, as I was able to establish by supplementary operations, was the subsequent stretching of the paralyzed, flabby and tender tendons. This induced me in the year 1898 to abandon the Nicoladonian method, in which the belly of the invigorating healthy muscle is transplanted into the paralyzed tendon, and in its place to sew the invigorating muscle directly into the periosteum. As to whether the old Nicoladonian transplantation or the new periosteal method is the more advantageous has been for many years much disputed in Germany. To-day the periosteal method is probably preferred by most orthopedists. The census of the American physicians, which was taken by my highly esteemed friend Lovett in Boston, was of decisive value in determining the opinions here. Out of thirty-three physicians, twenty-eight declared themselves in favor of the periosteal method and only five for the old Nicoladonian transplantation. It is thereby probably sufficiently proved that in general the periosteal method is preferred. I do not mean by that that you should always transplant directly the periosteum. Now and then I myself make use of the paralyzed tendon, if it is very strong, as, for instance, the Achilles tendon, and sew the belly of the invigorating muscle directly into it, but the periosteal transplantation has become the rule with me and probably with other orthopedists. I use an artificial tendon made of silk to lengthen the muscle. The method of using artificial tendons was first carried out in the year 1875 by Auger, who used a piece of this material to supply the loss of a tendon. Gluck, in Berlin, then demonstrated by numerous experiments on animals that you could cause artificial tendons made of catgut to heal in and that catgut is replaced in the body by connective tissue. Gluck has also made successful experiments of this kind on men. His reports were not received with the confidence they deserved.

When I, in the year 1899, for the first time introduced a silk tendon in an operation for the transplantation of a quadriceps, I was not free from apprehension that the silk tendon would finally be expelled. My experience with men and numerous experiments on animals demonstrated to me that my fears were without foundation. Allow me to go a little further into the matter of artificial tendons.

That the most painstaking asepsis in the operation is under all circumstances necessary is a matter of course. Tendons which have been boiled only in pure water heal up best. Such a silk tendon is covered with a capsule of connective tissue in a few weeks without the manifestation of any pronounced inflammation. The permanent results of these silk tendons boiled in water are not good. If the human body contracts an infection and bacteria circulation in the blood, then the bacteria settle with predilection in these silk strings and cause a suppuration which renders the removal of the silk threads necessary. This experience with silk threads which have been used for tying has often been made. Not infrequently such a thread abscess appears many years after the operation and leads to the expulsion of the silk. This experience shows that the silk thread must be saturated with some antiseptic, if it is to be permanently secure against an attack of bacteria. I proceeded, therefore, to boil the silk in a solution of sublimate, one to one thousand, before the transplantation. The sublimate, as was established, enters into an intimate, extraordinarily permanent chemical union with the silk and seems to permanently protect it against a later infection by bacteria which circulate in the blood and to prevent the formation of a subsequent thread abscess. I have at least never as yet experienced a secondary infection, among the many hundreds of silk tendons, in a tendon that has been healed in for several months and has functionated. The sublimate silk protects us indeed from a subsequent infection, but it has a disadvantage: healing takes place with much more difficulty than when the silk is boiled in pure water. If you investigate the healing process with sublimate of silk in experiments on animals you will find that the sublimate silk ten days after its insertion causes a collection of secretion in its immediate neighborhood. This pus-like secretion is entirely free from bacteria, as the bacteriologic examination shows, and arises without doubt from the chemical irritation which the sublimate exercises on the leukocytes. This aseptic secretion is, as a rule, reabsorbed in animals, and finally a distinct capsule is formed in the immediate vicinity of the silk. In men, according to my experiments, the reabsorption of this pus-like secretion does not take place so well as in animals. We must enable this secretion to escape. For this purpose I drain the places in which I have inserted silk tendons for two days with a wick of sublimate gauze. The wounds which show a secretion must then be carefully

dressed, often for two weeks, because otherwise an infection of the originally aseptic secretion and thereby also of the silk can easily take place. By this the healing of the silk boiled in a sublimate is made very difficult and tedious. This induced me to seek a thread that would heal as easily as the silk boiled in water and be as secure against subsequent infections as the sublimate silk. By experiments on animals, carried out by my assistant, Dr. Frey, I was able to establish that these requirements are best fulfilled by a paraffin-sublimate silk. This silk you obtain by cooking the silk, which has been boiled in sublimate and then well dried for two days under aseptic precautions, for an hour in paraffin (melting point, 60°), in a water bath; the paraffin makes the direct contact of the sublimate with the fluids of the tissues difficult, as we are also able to establish by experiments on animals, and thereby prevents the occurrence of the pus-like secretion. I have used this paraffin-sublimate silk for five years exclusively for my artificial tendons, and I can recommend it to you most highly with the greatest conscientiousness as the result of my favorable experience. If, notwithstanding the employment of this silk, a silk tendon does not help, you may assume either that you have not proceeded properly in the preparation of the silk, or that a mistake has been made in the technic of the operation.

I have gone particularly into the introduction of the artificial tendons because I think that silk is employed much too little in surgery. Above all, it is much too little recognized that silk which is functionally employed is penetrated and surrounded with a very firm and thick connective tissue. At the time of removal of the plaster-of-Paris bandages from patients on whom I have operated two months before, the artificial tendons can be felt to be only as thick as immediately after the operation. When, however, the silk tendon has worked for some time it becomes thicker and thicker. Finally, the artificial tendons attain, for instance, in a quadriceps plastic, in which they are originally only as thick as a knitting needle, the thickness of your little finger. Thereby the extremely interesting condition was found that a thick covering of true tendon tissue had penetrated into the interior of the silk and was thoroughly grown together with it. This encapsulation with true tendon tissue guarantees the durability of the artificial tendons and shows that we can cultivate a firm connective tissue in places where we need it.

The transplantation into the periosteum and the silk tendons

are not alone sufficient to obtain entire success in a tendon transplantation, but they must be assisted by a proper plan of operation. About this there was also a dispute among the German orthopedists for many years. Vulpius wanted to replace every muscle that had been lost. In order to accomplish this, he divided the sound muscle into two or three parts and transplanted these parts hither and thither. Thereby the plan of the operation became extraordinarily complicated. The operation did not fulfil the expectations of the operator, for the separated parts of the muscle did not learn to work independently but always contracted simultaneously with the original muscle, and it was, therefore, not possible in this way to again restore the functions of the paralyzed muscles.

I, therefore, adopted the principle that we must sacrifice unimportant functions, and that only the most important movements should be re-established. If you go about it properly you can transplant important muscles and can leave out of the question the complicated and impracticable division of the muscle. The plan of operation is thereby extremely simplified. It is sufficient on the foot if I have three healthy muscles at my disposition; these I divide so that I have one muscle as plantar flexor, which I allow to draw on the calcaneus at the normal point of attachment of the tendon Achillis. The other two muscles extend as dorsal flexors on the front of the lower leg and the foot. The muscle which simultaneously supinates must be sewed into the navicular bone and the pronating flexor into the cuboid.

By the extension of the muscle it is generally indifferent how the upper central half of the muscle extends: it may describe a curve or another irregular crooked line. The direction of the lower peripheral half is decisive for the working. An example will best illustrate this. If I wish to use the peroneus longus as a substitute for the tibialis anticus, I cannot conduct it in a straight line to the navicular bone. The new muscle will thereby indeed receive dorsal flexor attributes, but will not supinate the foot as the lost tibialis anticus did, but it will pronate it and draw it over into a pronated position. In order that the new muscle may supinate it must have in its lower half exactly the same direction as the tibialis anticus.

Finally, you must lay weight on a careful supplementary treatment with night splints and supports. You cannot, in the beginning, after the removal of the bandage, exact too much from the

muscle, or else it may stretch or tear. On this point there is no difference among the orthopedists, and therefore I leave this point. All that I have here described I have followed out for years and notwithstanding my results were very varied. I succeeded, it is true, by the transplantation of the tendons in preventing a relapse of the deformity which took place so often in simple tenotomy and redressment, and I also had the satisfaction that the invalids learned to walk without apparatus, or, at most, with a small splint. But I did not regularly accomplish a complete re-establishment of the function. The function of the transplanted muscle often did not return or remained weak; this I have especially observed in the foot. In the transplantation of the quadriceps the restoration of the function is much more complete. This is singular, for the work which is necessary for the movement of the knee-joint is much greater than that for the movement of the foot. What I was still more astonished at was the extraordinary function I obtained when I substituted the vastus externus for the gluteus medius and minimus. In this operation I detached the upper attachment of the vastus externus from the trochanter major, wove eight or ten silk threads into it and sewed these into the crista iliaca. By this operation the patients receive the power of adduction of the leg in a most normal way. These observations showed that the want of success in the transplantation in the foot must have a distinct cause. I therefore examined more carefully a number of patients in whom the functions of the transplanted muscles had not been restored. The transplanted tendon had united with tendonous adhesions very firmly to the bones, ligaments and fascia, and thereby every movement of the transplanted tendon, and with it of the foot, had become impossible. If, notwithstanding these attachments, the patients were saved from a relapse, this occurred because the attached tendon had fixed the foot in the corrected position exactly as in a tenodesis. How, then, were these attachments to be avoided? I accomplished it by boring a channel for the muscle directly through the adipose tissue, so that the transplanted muscle was always separated by a layer of fat from the fascia and the other tissues. In this way the attachment between the tendons and the bones or the fascia was avoided. Since I have done this I have no longer to complain of insufficient function of the transplanted muscles.

If you take into consideration the great difficulties which the

development of the method of operating in transplantation of tendons has undergone, you will be able to understand and properly appreciate that in recent years many objections have been made to the operation. At the Paris Congress of Surgeons, in the year 1907, most of the surgeons were inclined to arthrodesis and condemned tendon transplantation. But when you hear that the first chairman of the committee on this subject, Dr. Kirmission, of Paris, had only performed fifteen tendon transplantations, and expressed his disinclination for this operation after so little experience, it does not weigh much in the scale. I can also explain the unfavorable inclination which Lorenz has to the transplantation of tendons only on the ground that he has formed his opinion from a small number of operations.

We have all, perhaps, in the beginning, in the first burst of enthusiasm, performed too many tendon transplantations. We have thereby learned to distinguish more sharply between the indications for the transplantation of tendons and arthrodesis. We shall also still learn, I have no doubt, to improve the results of our tendon transplantations. The transplantation of tendons has already brought endless blessing to our cripples and it may with justice be counted among the greatest advances that orthopedic surgery has made in the last decade.

CHOREA A SYMPTOM, NOT A DISEASE.—Swift (*American Journal of the Medical Sciences*, September, 1909) maintains that chorea should be looked upon as a symptom in the same way as jaundice, convulsions, or dropsy, and not as a definite disease. Chorea may be divided into two classes. In the one the movements are a symptom of some infection, such as malaria, or with the pneumococcus, the *bacillus typhosus*, or the *micrococcus rheumaticus*, in many of which cases there is an accompanying heart lesion. Treatment depends upon the nature of the infecting organism, but absolute rest, both mental and physical, is essential. In the other group the cause is not so definite. The patients are usually young girls between seven and fourteen years of age. They are generally in a condition of bad health and anemic, and have been subjected to some mental or physical strain. The condition is quite analogous to hysteria in older people. All the treatment necessary is rest, good feeding and tonics.—*British Journal of Children's Diseases*.

CLINICAL SIGNIFICANCE OF LACK OF DEVELOPMENT OF THE PYRAMIDAL TRACTS IN EARLY INFANCY.*

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It is a fact of great physiologic and pathologic importance, in the development of the spinal cord, that the fibers of the pyramidal tract are the last to become myelinated. At birth they have almost no myeline sheaths and, until their myeline sheaths are developed, it is believed that motor impulses cannot readily be carried from the brain to the spinal cord cells. It has been noted that electrical excitation of the cerebral motor cortex of dogs at birth is not followed by muscular movements (of extremities, etc.), presided over by spinal motor cells. This phenomenon was for a time explained on the supposition that the cerebral motor cortex is nonexcitable in very young animals, and this nonexcitability was thought to be due to a lack of development of cortical motor areas. While this hypothesis may serve as a partial explanation of the above phenomenon, it is now known that on or about the tenth day of the life of the dog, when the pyramidal tract has acquired its myeline sheaths, an excitation of the motor cortex will produce motion in muscles over which the spinal motor cells preside. The absence, or partial development, of the myeline sheaths of the pyramidal tract in very young animals may interfere wholly or partially with the lines of communication between the cerebral motor centers and the spinal motor cells. †“Day by day, as these myeline sheaths are developed, the cerebral and spinal motor cells are brought into closer communication, and very early in the life of the animal (ten days in the dog, and perhaps three or four months in the human infant) communication may be said to be fairly well established; prior to this time the communications are imperfect.”

The above physiologic facts are of great pathologic importance, and if we had sufficient data to rightly interpret them in their clinical bearings on the neurotic disorders of infancy they would throw much light on some of the unexplained clinical manifestations of these diseases.

* Read by title at the Twenty-second Annual Meeting of the American Pediatric Society, Washington, May 4, 1910.

† “Neurotic Disorders of Childhood.” Rachford, 1905.

I hope I may be indulged in some suggestions and reflections as to the possible rôle which this lack of development of the pyramidal tract may play in producing nervous symptoms in early infancy.

A—Convulsions in Infancy.

The above physiologic facts may be offered in explanation of the comparative immunity which young infants enjoy from convulsive disorders during the first few months of their lives. It is probably true that during the first months of life the motor areas of the cerebral cortex are not sufficiently well developed to readily respond to stimulation, and it is also true that at birth the peripheral endings of sensory nerves are not so perfectly developed or so keenly sensitive to reflex and other stimuli as they are some months later, and it is also true that during this period of life the nervous system of the infant is not so much exposed to irritation by systemic and gastrointestinal bacterial toxins as it will be a few months later. It is also possible that, while all of these causes may be operative in protecting the young nervous system from convulsive disorders, the most potent factor operating toward this end may be the lack of development of the pyramidal tract. Such, in fact, is my belief. Irritation of the motor cortical centers and of the basal convulsive centers may produce a discharge of nerve force from these cells, but the motor impulse, through lack of development of the pyramidal tract, is imperfectly, or not at all, communicated to the spinal motor cells, and, therefore, no convulsion results.

But even in these early days of life it is not probable that the paths of communication are so completely closed that very powerful stimuli may not send an impulse from the brain to the cord. As the infant grows older, however, the communications between the brain and cord, through the pyramidal tract, become better and better established, and, as a result, convulsive disorders become more and more frequent as these communications are perfected. It is probable that the period when the pyramidal tract reaches full development may vary greatly in different children.

B—The Plantar Reflex and Babinski's Sign.

In 1898 Babinski called attention to certain variations in the plantar reflex produced by disease of the pyramidal tract. He observed that in cases presenting a lesion which interfered with the conducting power of the pyramidal tract, there were present

certain variations from the normal plantar reflex. In normal adult individuals the reflex, elicited by plantar irritation, is *flexion of the toes*; in pyramidal disease, however, the response to this reflex is *extension of the toes*. This observation of Babinski has been confirmed by many observers, so that at the present time extension of the toes (especially the big toe) is recognized in the adult and older child as a valuable sign of pyramidal disease, and the accepted physiologic explanation of this sign is that it is brought about by the more or less complete destruction of the conducting power of the pyramidal tract, thus interfering with the lines of motor communication between the brain and the cord. In this manner certain inhibitory influences, which the brain exercises over spinal reflex movements, are wholly or partially cut off.

Babinski also observed that this extension of toes, which is the pathologic reflex response to plantar irritation in the adult and older child, and which is due to the severing of the pyramidal lines of communication between the brain and the cord, is the normal reflex response in young infants. In infants under one year of age *extension of the toes* is the normal response to plantar irritation, because of the incomplete development of the pyramidal tract at this age. This explanation was offered by Baginski and has been accepted by a number of recent observers.

That the normal *toe-extension* reflex of infancy is less constant and less deliberate than the pathologic toe-extension reflex of the adult does not militate against the above explanation. The unreliability and inconstancy of the toe-extension reflex in infancy (as pointed out by Morse and others) may be explained by the incomplete and irregular development of the reflex spinal centers in the young infant and by the variations which individual infants present in the development of their pyramidal tract, but the fact remains that toe-extension is the normal plantar reflex in young infants, and lack of development of pyramidal tracts is the only rational explanation of this phenomenon.

C—Infantile Cerebral Palsies.

It is a well recognized fact that in the cerebral palsies of early infancy, produced by cortical hemorrhages and other lesions affecting the motor centers of the young infant, the lesion may precede by many months the appearance of the spastic paralysis which is characteristic of this condition. This is especially true

of the cerebral palsies produced by natal and prenatal injuries to the brain. In speaking of these cases, Sachs* says: "It is a matter of fact that the symptoms of such intrauterine defects are not always manifest at birth, and, indeed, a number of months may pass before it becomes evident to the physician that the child's cerebral condition is not a normal one. A very fair percentage of cases which appear to begin during the first years of life could properly enough be classified among the prenatal palsies, and if in any child the first symptoms of a cerebral palsy are noticed several months after birth, and yet the period of labor was entirely normal, I should be inclined to classify that case rather among the prenatal palsies than among the birth palsies."

While it is a well known fact that injury to the cortical motor areas of an infant before or during birth may not for *some months* be followed by the characteristic spastic palsies of the extremities, yet the explanation for the delay in these symptoms is not apparent. The question, therefore, arises: May not these clinical phenomena be explained by the late development of the pyramidal tract? At birth the fibers of the pyramidal tract, by reason of the absence of myeline sheaths, afford but very imperfect lines of communication between the cerebral motor cortex and the motor cells of the cord. An injury to the cortex, therefore, may not be communicated to, and may not influence the functions of, these cells, and, as a result, the functions of the spinal cord in the infant are, for the time being, not disturbed. But as the days and months pass certain of these pyramidal fibers not directly involved in the lesion, take on their myeline sheaths, and along these lines the injured region in the cortex is gradually put in closer communication with the spinal motor cells, and as a result the spastic paralysis gradually develops, producing the characteristic clinical picture about the fourth month.

* "Nervous Diseases of Children." Sachs.

NITROGEN METABOLISM IN HEALTHY (ARTIFICIALLY-FED) INFANTS.*

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Metabolism work on infants dates back about fifteen years. Most of the research has been done by German and French workers. With a practical end in view a very large part of the work has been done on sick infants. Forty or fifty quite complete researches have been done on sick children, most of them on malnutrition and gastroenteritis cases.³ These fields have been well worked and have yielded abundant harvest in our better understanding of these conditions.

It has seemed to me, however, in making a study of the literature on this subject that we are exceedingly deficient in data from what may be considered normal cases. Until "normal" metabolism can be defined, through a study of sufficient cases, it seems to me rather difficult to draw definite conclusions from a study of the metabolism in abnormal conditions.

In the normal cases which have been studied a large part of them have been infants fed on breast milk, and but a pitifully small number on modified cow's milk, so few, in fact, that the data derived from a study of them is not at all convincing as to what constitutes normal metabolism in infants fed on cow's milk.

In the early literature on this subject there are several extensive pieces of work reported on normal infants fed on cow's milk. One by Rubner and Heubner,¹ another by A. Keller,² and Czerny and Keller³ quote from one by Ullmann.

The work of Rubner and Heubner is by far the most complete covering the metabolism of nitrogen, fat, carbohydrate, potassium, sodium, calcium, magnesium, iron, chlorin, sulphur and phosphorus, determining the loss by respiration and through the sweat, as well as through urine and feces. Their work was of such a wide scope that a careful study of it, with a just appreciation of the time and patience required, tends to discourage one from ever trying to duplicate it unless unlimited time and opportunity can be given to it.

* Read before Section on Pediatrics, New York Academy of Medicine, October 13, 1910.

The work of A. Keller was of narrower scope, covering a study of the nitrogen and phosphorus metabolism in a normal infant.

Later there have been a number of other excellent pieces of work done; for example, Freund⁴ on the sulphurs, Meyer,¹² Schloss,¹³ Meyer, L. F.,⁷ and Bruck.¹⁴

The study of nitrogen metabolism, which I present, is a portion of a larger metabolism problem which involved the determination of the nitrogen, fat, sulphur, magnesium and calcium in the food, urine and feces covering a nine-day period, divided into three periods of three days each.

The child used for this study was a healthy, robust, vigorous infant of nine months, fed from birth on modified cow's milk, who was admitted to the children's ward of the Presbyterian Hospital, in the service of Dr. E. Eliot, for operation for the closure of harelip. A previous operation had been performed, and in the interim between operations Dr. Eliot very kindly permitted the child to be used for metabolism purposes. Dr. Eugene Opie, pathologist, and Drs. Cecil and Dubois, his assistants, coöperated heartily in the undertaking, the last named devising a most excellent metabolism apparatus, through the use of which perfect results were obtained in the collection of the urine and feces. To these gentlemen and their laboratory staff I extend my thanks.

In my desire to present this subject as concisely as possible, I have had prepared a table based on percentages rather than stating definite amounts. However, since I have stated the definite amount of the nitrogen intake, one can for himself, if he so desires, compute the actual amount in grams for twenty-four hours under the various headings.

Before referring further to the chart, permit me to outline briefly the technic followed.

The child was fed on three different cow's-milk mixtures. These involved the use of (certified) whole milk, fat-free milk and 16 per cent. cream, all of which were secured from the Walker-Gordon milk laboratory, and when modified represented a low fat, medium fat and a high fat formula. Specimens of each of the three types of milk were carefully analyzed. The child was kept on a definite formula at least two days before being put in the metabolism frame, and was kept three days continuously in the frame and given the same formula, so that the feedings were of five days' duration, while the metabolism experiment covered the last three days of the period.

After each three-day period in the frame the child was given a rest for about ten days before being put into the frame again, during which time he was fed on Walker-Gordon certified whole milk. This period of rest gave the child ample time to recover his normal activities before going into the frame again. I might suggest here that the putting of the child in the frame involves not the least hardship for the child; indeed, it was the universal opinion among the nurses that the child was happier in the frame than out of it.

The urine was collected daily and the total nitrogen, urea, ammonia and kreatinin determinations were made the same day, as were also the tests for acetone, diacetic acid and beta-oxybutyric acid¹¹ and total acidity. The urine was then placed on ice until the salts were analyzed.

The feces were collected in daily quantities, except in two instances, when forty-eight hour periods were collected, were dried over water bath, pulverized and passed twice through a No. 40 sieve and stored in glass containers until examined.

The methods used for the nitrogen determinations with which this paper deals were the Kjeldahl method for total nitrogen, Folin's method for ammonia,⁸ Folin's method for kreatinin,⁹ and Folin's method¹⁰ for urea. Controls were made and repeated where necessary.

Keller's child weighed 4,900 grams and lost 6 grams during the five days; Rubner and Heubner's case weighed 7,570 grams at beginning and gained 21.66 grams during the seven days. My child weighed 7,852 at beginning and gained 439 grams during the nine days. It is evident that Keller's and Rubner and Heubner's cases were underfed. Keller's case received 1,000 c.c. daily of a very weak formula, while that of Rubner and Heubner was fed 1,000 c.c. daily of a stronger formula.

Estimating the nitrogen intake in the food per kilo of infant's weight Keller's daily average was .454 grams, Rubner and Heubner .580, while in this case the daily average was on "low fat" period, 1.05 grams, "medium fat," .914, "high fat," .866, an average for the nine days of .943 gram.

Let us now turn to a study of Table No. I. In columns Nos. 1 and 2 I have placed the per cent. of fat and proteid in the feedings so that those who use percentage feedings may readily understand the strength of the food used.

TABLE NO. I.

FOOD NITROGEN; ITS ABSORPTION, RETENTION AND FORMS OF ELIMINATION.

	% of Fat in Food.		% Proteid in Food.		Proteid Intake in grams in 24 hours.		Nitrogen intake in grams in 24 hours.		% Food Nitrogen passed in Feces.		% Food Nitrogen absorbed.		% Food Nitrogen in Urine and Feces.		% Food Nitrogen retained.		% Food Nitrogen passed in Urine.		% Food Nitrogen passed as Urea.		% Food Nitrogen as Ammonia.		% Food Nitrogen as Kreatinin.		% Food Nitrogen as undetermined. (amino-acids)	
Column.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.													
Low Fat Period	2.1	4.1	53.1	8.5	4.4	95.6	63.2	36.8	58.8	44.9	1.5	2.6	9.7													
	2.1	4.1	53.1	8.5	3.2	96.7	65.4	34.6	62.2	55.9	2.3	0.9	4.1													
Medium Fat Period	2.1	4.1	53.1	8.5	3.2	96.7	65.4	34.6	62.2	55.9	2.3	0.9	4.1													
	4.0	3.5	44.8	7.2	1.9	98.1	76.8	23.2	74.9	61.2	2.7	0.9	9.1													
	4.0	3.5	44.8	7.2	5.0	95.0	67.3	32.7	62.3	36.3	20.8	0.6	4.5													
High Fat Period	4.0	3.5	44.8	7.2	8.1	91.9	67.4	32.6	59.3	29.5	22.9	0.4	6.5													
	5.5	3.3	43.3	6.9	1.6	98.4	73.0	26.9	71.4	61.9	3.9	0.4	5.2													
	5.5	3.3	43.3	6.9	1.9	98.1	65.7	34.3	63.8	29.2	11.8	0.1	22.7													
Average	5.5	3.3	43.3	6.9	5.4	94.6	63.5	36.5	58.1	33.7	17.7	0.1	6.7													
	2.1	4.1	53.1	8.5	3.8	96.2	64.7	35.3	60.9	52.4	2.1	1.4	4.8													
	4.0	3.5	44.8	7.2	5.6	94.4	70.5	29.5	64.9	42.2	15.5	0.6	6.6													
Average	5.5	3.3	43.3	6.9	2.9	97.1	67.4	32.6	69.6	44.7	12.7	0.6	11.5													
	3.8	3.6	47.1	7.5	4.1	95.9	67.5	32.5	63.4	46.8	9.6	0.9	8.6													
	0.7	1.3	13.9	2.2	6.3	93.7	65.9	34.1	59.5																	
Rubner & Heubner	3.2	2.7	27.5	4.4	6.4	93.5	76.2	23.8	69.8																	

You will note that the percentages in the first group called "Low Fat" are fat 2.1 per cent. and proteid 4.1 per cent.; in the second group called "Medium Fat," 4 per cent. and 3.5 per cent., respectively, and that the group called "High Fat" consisted of fat 5.5 per cent. and proteid 3.3 per cent. You will note the average for the nine days was 3.8 per cent. fat and 3.6 per cent. proteid.

In Keller's case, which was an infant, two and three-quarters months old, the percentages were very much lower, viz.: 0.7 per cent. fat, 1.3 per cent. proteid; ratio fat to proteid of 1 to 2, which is the ratio in my "low fat" group, while the feeding in Rubner and Heubner's case, an infant, seven and one-half months of age,

was fat 3.2 per cent., proteid 2.7 per cent.; ratio fat to proteid, 1 to .87, which is nearly the same as my "medium fat" feeding. Hence in making comparisons on basis of percentages, Dr. Keller's case should be compared with my "low fat" and Rubner and Heubner's with my "medium fat" feedings.

In column No. 3 I have placed the proteid intake in grams in twenty-four hours. "Low fat" period, 53.1 grams, "medium fat," 44.8, and "high fat," 43.3, with an average for the nine days, 47.1 grams.

Column No. 4 represents the nitrogen intake in grams in twenty-four hours, being 8.5, 7.2 and 6.9 for low, medium and high fat periods, respectively, with the average intake per day for nine days of 7.5 grams, while Keller's case was given 2.2 grams and Rubner and Heubner's 4.4 grams.

Column No. 5 represents the amount of nitrogen passed in the feces. In studying the nitrogen output by the feces, it is better to take the average for each of the three-day periods rather than individual days.

You will note that under "low-fat" feeding 3.8 per cent. of the food nitrogen was excreted, 5.6 per cent. under "medium-fat" feeding, 2.9 per cent. under "high-fat" feeding, while the average per day for the nine days was 4.1 per cent. Whether this nitrogen thus eliminated was a portion of the food nitrogen ingested, but which was not absorbed while passing through the intestinal tract, or whether it represents a certain amount excreted from the body into the intestinal canal, cannot be definitely stated. But we do know that, whether passing through the intestine unabsorbed or excreted from the body into the intestine, the amount which was lost in the feces is represented by the above figures.

Keller's child passed 6.3 per cent. in the feces, and Rubner and Heubner's 6.4 per cent. These figures are somewhat higher in per cents. than mine, but when we estimate the amount per kilo we have the following result:—

ACTUAL AMOUNT NITROGEN PER KILO OF BODY

WEIGHT PASSED IN FECES IN 24 HOURS.

During "low-fat" period.....	.065	grams
During "medium-fat" period.....	.048	"
During "high-fat" period.....	.025	"
Average for nine days.....	.046	"
Keller's Case XII.....	.029	"
Rubner and Heubner's case.....	.037	"

Let us now pass to a consideration of column No. 6, which has to do with that portion of the ingested nitrogen which was not passed in the feces. Just how long it remained in the intestine before being absorbed, or whether it was absorbed quickly or slowly, we are not here interested, but the fact that the nitrogen not passed in the feces was ultimately absorbed into the body from the intestinal tract is quite apparent. Therefore column No. 6 is obtained by considering the amount ingested 100 per cent. and subtracting from it the per cent. passed in the feces.

A glance down column No. 6 shows us how splendidly nitrogen is absorbed in the normal infant. You will note the day-to-day per cent. compares very closely, the average being 96.2 per cent., 94.4 per cent. and 97.1 per cent. for the "low," "medium" and "high-fat" periods, while the average for the nine days is 95.9 per cent. Keller's figures are 93.7 per cent. and Rubner and Heubner's are 93.5 per cent. These figures are very close, in spite of the fact that the actual amount per kilo of body weight varied greatly, as the following shows:—

ABSORPTION PER KILO BODY WEIGHT OF NITROGEN
IN GRAMS IN 24 HOURS.

During "low-fat" period.....	.985	grams
During "medium-fat" period.....	.866	"
During "high-fat" period.....	.841	"
Average for nine days.....	.897	"
Keller's Case XII.....	.425	"
Rubner and Heubner's case.....	.543	"

Column No. 7. This column represents the combined amount of nitrogen passed out of the body by way of the feces and urine, and is obtained by adding the fecal nitrogen and urinary nitrogen together and determining its proportion of the food nitrogen.

A glance down the column shows that the highest elimination in any one day was 76.8 per cent., while the lowest is 63.2 per cent. of food nitrogen eliminated by feces and urine. That the average for "low-fat" period was 64.7 per cent., average for "medium-fat" 70.5 per cent., average for "high-fat" period was 67.4 per cent., while the average for the nine days was 67.5 per cent. The average in Keller's case was 65.9 per cent. and of Rubner and Heubner's 76.2 per cent. of food nitrogen.

By glancing again at column No. 5 we readily observe that the largest part of the nitrogen elimination is by the urine.

There is, however, another avenue of nitrogen excretion which must be taken into consideration, viz., that by the sweat.

Rubner and Heubner's case is the only one completely worked out which includes this observation. For the six days studied the average amount per day excreted in the sweat was 0.186 grams, or 5.2 per cent. of the entire nitrogen excreted in twenty-four hours. This .186 gram nitrogen excreted in the sweat represented 4.3 per cent. of the nitrogen intake. Having, therefore, discussed the amount which left the body in the way of feces, urine and sweat, we are now prepared to consider the amount of nitrogen which was left in the body.

We will find this in column No. 8.

The percentages in column No. 8 are obtained by adding together the percentages of nitrogen passed by urine and feces and subtracting from the nitrogen ingested, which we regard as 100 per cent.

No attempt was made to estimate the amount lost in the sweat, as this required larger facilities than were offered, and therefore my figures for retained nitrogen are larger than they should be, by so much as was excreted through the sweat. I have just pointed out that in Rubner and Heubner's case the amount so excreted equalled 4.3 per cent. of the food nitrogen, and it would therefore be well to consider the percentages which I have included in column No. 8 reduced by that much.

As one glances down the column one is struck with the fact that the percentage retained is exceedingly low, averaging from 23.2 per cent. to 36.8 per cent., the average for "low-fat" period being 35.3 per cent., "medium-fat," 29.5 per cent., and "high-fat," 32.6 per cent., while the average for the nine-day period is 32.5 per cent. In Keller's case, in which no account was taken of the amount lost by sweat, the per cent. is 34.1. In Rubner and Heubner's case, in which the amount lost in the sweat was taken into account, we find a much smaller per cent. of retention, viz., 23.8 per cent. Calculating the amount retained per kilo the amounts are:—

AMOUNT OF NITROGEN IN GRAMS IN 24 HOURS
RETAINED PER KILO BODY WEIGHT.

During "low-fat" period.....	.362	grams
During "medium-fat" period.....	.270	"
During "high-fat" period.....	.285	"
Average for nine days.....	.306	"
Keller's Case XII.....	.155	"
Rubner and Heubner's case.....	.1402	"

Let us consider the amount of nitrogen absorbed per kilo of body weight together with that which was retained and excreted:—

	Amount Nitro- gen in grams absorbed in 24 hours, per kilo body weight.	Amount Nitro- gen in grams retained in 24 hours, per kilo body weight.	Amount Nitro- gen in grams excreted in 24 hours, per kilo body weight.
"Low-fat" period.....	.985	.362	.623
"Medium-fat" period.....	.866	.270	.596
"High-fat" period.....	.841	.285	.556
Average for nine days.....	.897	.306	.591
Keller's Case XII.....	.425	.155	.270
Rubner and Heubner's case.	.543	.140	.403

In healthy breast-fed babies, according to Michel,⁵ the per cent. of nitrogen absorbed is about the same as in cow's milk-fed babies, but the amount retained is very much higher, reaching to even 85 per cent. of the food nitrogen, and Langstein and Niemann⁶ have recently found that newborn infants may retain as high as 69 per cent. of the nitrogen intake. Whereas, in cow's milk-fed babies the average per cent. of nitrogen retained is about 30 per cent. of the food nitrogen.

Column No. 9 gives the per cent. of food nitrogen passed in the urine, and columns Nos. 10, 11, 12 and 13 give the percentages of food nitrogen of the various nitrogen bodies in the urine. The one column of particular interest is No. 11, which shows the ammonia nitrogen excretion in per cent. of food nitrogen. It will be noted that the ammonia excretion remained low in the "low-fat" period, but that during the "medium-fat" period and the "high-fat" period there was a very large increase, reaching as high as 22.9 per cent. of the food nitrogen.

From the fact that but 1 case was used in the experiments, no definite conclusions should be drawn, but certain observations may be permitted.

OBSERVATIONS ON NITROGEN ABSORPTION.

1. Nitrogen is absorbed exceedingly well by healthy infants fed on cow's milk mixtures.
2. The per cent. of absorption at varying ages is about the same, even though the intake of nitrogen per kilo differs greatly.
3. Nitrogen absorption is carried on equally well under low, medium and high-fat feeding.
4. The per cent. absorption varies little from day to day.

OBSERVATIONS ON RETENTION OF NITROGEN.

1. The proportion of the food nitrogen which is retained is about one-third.
2. The per cent. retained is about the same for the three ages discussed.
3. Retention takes place in about the same per cent., whether fed on low, medium or high fat.
4. Percentage nitrogen retained remains about the same, whether fed on low, medium or high proteid.
5. In high proteid feeding a larger amount of nitrogen is absorbed and eliminated, thus causing more "work" to be performed by the infant than on a lower proteid feeding.
6. Body weight may diminish under a fair nitrogen retention.

OBSERVATIONS ON NITROGEN ELIMINATION.

1. Nitrogen is largely eliminated through the urine. Considerably more than half of the nitrogen ingested is excreted in the urine.
2. A very small quantity is found in the feces.
3. The excretion of ammonia nitrogen was higher on "high-fat" mixtures than on "low-fat" mixtures.

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SOCIETY REPORTS.

THE NEW YORK ACADEMY OF MEDICINE.—SECTION ON PEDIATRICS.

Stated Meeting, Held October 3, 1910.

DR. ELI LONG, CHAIRMAN.

REPORT ON THE USE OF EHRLICH-HATA 606 FOR THE CURE OF SYPHILIS.

DR. HERBERT BUDDINGTON WILCOX presented a girl of twelve years, who was first seen at the Bellevue Clinic suffering from periostitis and muscle pains of syphilis in November, 1909.

After some weeks' treatment in the children's ward she returned to the clinic and was under weekly observation until August, when she developed a keratitis with severe inflammation of the entire eye, considerable hemorrhage and marked photophobia. Under the usual treatment there was no improvement at the end of two weeks, and Dr. M. S. Kakels then injected 3 decigrams of Ehrlich's 606. In twenty-four hours the evidences of acute inflammation had almost subsided. The photophobia was correspondingly diminished. In the six days following the exudate and hemorrhage rapidly absorbed, the cornea being to-day nearly clear.

There was considerable pain and edema at the site of the injection for forty-eight hours. The temperature rose to 101° F. on the second day and was normal on the fourth day. The urine was examined daily and was negative throughout.

There was a leukocytosis of 20,000 on the second day, dropping to 12,000 on the fourth day. The Wasserman reaction has shown gradual reduction in intensity, being very weak at present.

This patient illustrated the remarkable effect of Ehrlich's 606 on an acute inflammation due to syphilitic poison.

As illustrative of the action of the drug in clearing up the products of inflammation, Dr. Wilcox reported the case of a boy nine years of age, whom he had expected to present. This child had a double keratitis, leaving him with barely light perception. He was a patient of Dr. Denig and was sent to Bellevue for treat-

ment. He was given the same dose as the former patient and had no local reaction. The urine remained normal. The temperature rose to 101° F. on the second day. There was a leukocytosis of 15,000 for two days. On each of the six days following the injection there was noticeable lessening of the opacity of both eyes, and at the end of ten days he was able to distinguish objects at a distance of five feet.

The first patient gained 8 pounds in two weeks following the injection. No record was kept of the weight of the boy.

DR. CHARLES HERRMAN reported a case of hereditary syphilis in his service at the Lebanon Hospital, in which the mother had been injected by Dr. Kakels with Ehrlich's 606. The baby was at the breast and received the supposedly curative substances with the mother's milk. Several cases had been successfully treated in this way by German physicians. Thus far, that is, six days after the injection, the patient had not shown distinct signs of improvement. It is extremely important that cases of hereditary syphilis should have breast milk, and it has been suggested that in cases in which the mother is unable to give the breast, a syphilitic wet nurse should be injected with 606 and the baby nursed at her breast.

DR. ALFRED F. HESS said that last summer he saw 3 cases of hereditary syphilis treated with Ehrlich's preparation and in all disagreeable local symptoms developed after the injection into the buttocks. In 1 case, a miserable marantic child, necrosis developed six weeks after the injection. The children showed temperature elevation. The syphilitic symptoms disappeared. The local symptoms were quite severe. The injections were made by an experienced man and the solutions were neutralized.

A CASE OF CONGENITAL CARDIAC DISEASE WITHOUT CYANOSIS.

DR. F. L. WACHENHEIM presented a child, six years old. When examined, six months ago, there were positive signs of an open intraventricular septum and ductus arteriosus, with stenosis of the pulmonary conus. There was a loud murmur over the pulmonary site. In spite of the cardiac lesions, there was no cyanosis, and the relative frequency of this combination was referred to.

DR. WILLIAM P. NORTHRUP said that the question of the noise must depend upon the relation of the pressure on the two sides and the size of the openings. He made a diagnosis of congenital

pulmonary lesion. He had made a number of autopsies on these cases and he had verified about 8 of them.

DR. L. E. LA FÉTRA said that at the Vanderbilt Clinic he probably saw one instance every month of these congenital cardiac cases without cyanosis. It should be kept in mind, on the one hand, that marked congenital murmurs with no cyanosis are not at all uncommon; and, on the other hand, that there may be extreme cyanosis and clubbing of the fingers with absolutely no murmur to indicate the congenital heart deformity. In all doubtful cases, examination of the blood may be of value, since a high hemoglobin and a red-cell count of over 5,000,000 would indicate congenital heart disease.

A CASE OF HYSTERICAL SINGULTUS.

DR. SARA WELT-KAKELS presented a girl, twelve and a half years old, who had this condition, which had lasted four and a half weeks. Her parents were Russian Jews, both healthy. The mother was rather nervous. Six brothers and sisters died in early childhood; there were two abortions; three brothers and four sisters were living, all healthy except one, who was an inmate in a home at Randall's Island for the past fourteen years; she is said to be blind and crippled. This girl was born at full term; delivery was normal; she was not asphyxiated at birth, and had been always well except for an attack of measles when three years of age and an attack of diphtheria three years later. One year ago she had her tonsils and adenoids removed; otherwise, she had been perfectly well. At school she was a good pupil, and she had a good disposition. During the past six months she had hiccough occasionally, lasting for a few minutes at a time. Six weeks ago she received a sudden fright, and two weeks later, about four and a half weeks ago, her present condition showed itself, and had kept up constantly. On the last day of September she was shown before a society of German physicians. There the child was kept in a room by herself for some time, but the hiccough persisted. She was examined by several physicians. On her way home the hiccough ceased and remained away for six days, when it started again, and had kept up constantly since; it stops during the night, but starts immediately upon waking. The child had lost her appetite and complained of pain in the epigastrium. She slept well. The child had come under Dr. Kakel's care on September 28th. The

examination showed a well-developed child, weighing 86 pounds. The temperature and pulse were normal; the latter was sometimes accelerated. The deep reflexes were increased. There was anesthesia of both conjunctivæ. The sense of taste and smell was normal. There was no disturbance of sight or hearing. The singultus occurred about twenty-four times to the minute, and seemed to be worse while the child was being examined. For differential diagnosis, it is important to remember that persistent singultus occurs in diseases of the gastrointestinal tract and the peritoneum; it also may be dependent upon direct lesions of the phrenic nerve. It also occurs in myelitis (cervical portion). The treatment consists in rhythmic traction of the tongue, compression of the lower half of the thorax and insertion of the esophageal tube. In an epidemic of singultus, which attacked ten school girls, reported by Abeles, six were cured at the first examination. Electricity, hydrotherapy, opium and chloroform all produced good results. Hysteria was formerly believed to be dependent upon diseases of the female generative tract. It was thought impossible that girls under the age of puberty should suffer from it, and for the same reason the male sex was thought to be exempt from it. But hysteria is found in children among boys more frequently than at a later period of life. Bruns found in his cases that hysteria was most frequent between the seventh and fourteenth years; up to the ninth year cases were equally frequent among girls and boys; after that girls showed a greater predisposition; his youngest patient was a boy in his third year. The hysteria in children was characterized by the monosymptomatic character as well as by the absence of stigmata. This was explained by the greater simplicity of the psychic life of the child. The prognosis was better, since it was easier to influence the child's mind and the children were used to obedience. The treatment was solely psychic.

DR. WILLIAM P. NORTHRUP said he was struck by the suggestion of placing the child in a hospital. He recalled the case of a girl who lived in New Jersey and who was said to have epilepsy. When she came to the hospital she had as many as twenty-seven epileptiform convulsions on the first day; the second day she had twenty-seven fits. She was placed in the ward and her convulsions dropped shortly to twelve a day. After three weeks the number of fits was reduced to six a day, and soon ceased. She returned to her home and again the epileptiform convulsions ap-

peared. Here entered the question of the home life. The parents talked about fits before the child. At home the fits kept up. She was again returned to the hospital and placed on ward diet and ward regulations with the same effect as before; the epileptiform convulsions ceased. The latest report is that the child has not had an epileptiform convulsion in more than three years. The original diagnosis was epilepsy and this was confirmed by an expert neurologist. Her seeming entire recovery is the only reason for thinking it may have been hysterical and not true epilepsy.

PURPURA HEMORRHAGICA IN A BOY FIVE YEARS OF AGE
SUCCESSFULLY TREATED WITH HUMAN BLOOD SERUM

DR. CHARLES GILMORE KERLEY saw this boy in consultation with Dr. Corwin, of Rye, N. Y. The family history was negative. His tonsils and adenoids were removed six months before his present illness with no more than the usual bleeding. On June 15th the boy was taken ill and ran a temperature which ranged from 100° F. to 102° F.; this continued for one week. During this period there occurred numerous subcutaneous hemorrhages at various sites over the body and particularly on the legs. A large hematoma developed in the abdominal wall. There was some bleeding from the gums and the subcutaneous hemorrhages continued to appear on the chest, abdomen and legs. There was a moderate bleeding from a bicuspid tooth. The child was given calcium lactate in small doses, 3 grains every three hours. The hemorrhage from the gums stopped and the subcutaneous hemorrhages began to show signs of absorption. On July 7th, a little over two weeks after the first sign of the purpura, there was a hemorrhage from the nose which lasted one hour. On the day following there was another hemorrhage from the nose which lasted five hours and which resisted all the ordinary efforts at control. The patient was then seen by Dr. Kerley. He evidently had suffered much from the bleeding. The skin was pale and sallow, and showed in many areas the evidences of the previous subcutaneous hemorrhages. The calcium lactate was resumed in 10 grain doses every two hours. Because of the greatly reduced condition of the patient, normal salt solution was given through a tube introduced into the colon by the drop method. The stools at this time consisted largely of coagulated blood. By July 9th the hemorrhage appeared to be under control. Twenty grains of calcium lactate were given every two hours. On July 10th a

nasal hemorrhage began at 5 A.M. and continued for five hours. The saline irrigation that was given returned blood-stained. The child was now in an extreme condition, and 30 c.c. of human blood serum were injected hypodermically by Dr. Welch. During the remainder of the day from 45 to 60 c.c. of the human blood serum were injected at two-hour intervals until midnight. The amount injected in twelve hours was 290 c.c. In the evening there was an evacuation of the bowels, which was composed entirely of coagulated blood. On July 11th the stools contained blood and the expectoration contained some bright red blood. There was a moderate nasal hemorrhage. One hundred and sixty-seven c.c. of human blood serum were given in three doses, at 8 A.M., 3 P.M. and 9 P.M. On July 12th there was no visible hemorrhage from any portion of the body. Four injections of blood serum were administered, the total amount being 191 c.c. During the following three days three injections of the serum were given in quantities ranging from 20 to 30 c.c. On July 16th two injections were given of the serum at twelve-hour intervals, 44 c.c. in all; and on July 17th an injection of 35 c.c. was given. The total amount of serum given during the one week of treatment amounted to 1,034 c.c.

From this time the child made a slow but steady improvement, and eventually made a perfect recovery. It was of interest to note that the hemorrhage, which had continued intermittently for nearly three weeks, ceased within fifteen hours after the first injection of the human serum. It would seem that here was a case where, beyond possibility of doubt, the use of the human blood serum saved the life of the child.

MECHANICAL INJURIES (BLOWS AND FALLS) OF THE HEAD IN
INFANTS AND CHILDREN—THE NECESSITY FOR IMMEDIATE
TREATMENT—WHAT SHOULD THIS BE?

DR. H. ILLOWAY read this paper. (Dr. Illoway's paper will appear in December.)

NITROGEN METABOLISM IN NORMAL (ARTIFICIALLY FED)
CHILDREN.

DR. B. RAYMOND HOOBLER read this paper. (See page 853.)

DR. HERBERT B. WILCOX said that the question of nitrogen

metabolism was particularly important in the use of Finkelstein's Eiweissmilch in infant feeding.

In the infants' ward at Bellevue this had been made the routine diet for the past three months. The average child in the ward weighed less than 9 pounds, and took daily from his food, which contained 2.8 per cent. proteid, about 6 grains of nitrogen.

Apparently, all nitrogen ingested must be absorbed and excreted. The digestion has no means of avoiding the nitrogen task set it by the diet, and the working over of so large an amount for a considerable space of time must represent a metabolic strain.

After from two to three weeks of such feeding every one of these children begin to have too frequent and too large, although perfectly normal, stools, and at this point are likely to lose weight.

It is an interesting question how much bearing the excessive nitrogen metabolism has on this intestinal condition, and whether it evidences an attempt on the part of the body to aid the elimination of the large amount of nitrogen ingested.

DR. L. E. LA FÉTRA said that the page of figures presented had been made very interesting by Dr. Hoobler, and that there were two practical conclusions which could be drawn from even this single case, so thoroughly worked out. In the first place, he would emphasize that, while high nitrogen feeding has its advantages, it has also certain disadvantages. For instance, in cases of diarrhea, the use of Eiweissmilch, as indeed of fat-free butter-milk, permits giving food much earlier and food of a higher caloric value than has been found possible heretofore. This treatment prevents the severe loss of weight in such cases. On the other hand, there is the disadvantage of high proteid feeding that so little of the increased nitrogen is retained—only about one-third in the case of cow's milk preparations. This is in great contrast to the much larger quantity retained when breast milk is given. The retention of so little nitrogen means that high proteid feeding necessitates a great amount of work on the part of the organism to eliminate the two-thirds of the increased nitrogen, a process which is presumably a strain on the metabolic energy of the child. If breast milk were given, of course very much less nitrogen elimination would be necessary. Notwithstanding that breast milk has a lower proteid than cow's milk, it is necessary, on account of the smaller retention of nitrogen in artificial feeding, to use a higher quantity of proteid; but extremely high proteids undoubtedly put a strain on the organism.

The second conclusion to be drawn from the tables is that there is danger of acidosis from the use of high fats. Notwithstanding that the patient showed no nervous symptoms, the urine contained evidences of acidosis, and therefore the child was in danger of a nervous explosion. This must always be remembered when high fats are prescribed.

DR. HENRY DWIGHT CHAPIN said that one often observed that the diarrheal stools improved in their character, but the babies did not seem to gain in weight on the Finkelstein feeding. One must give the babies a high proteid diet, but apparently this did no good, for they could not take care of it.

THE INFECTIOUS AGENT OF WHOOPING-COUGH.—W. K. Menschikoff (*Russij Wratsch*, No. 31, 1909; Ref. *Der Kinderarzt*, May 5, 1910, p. 108) draws attention to the investigations of this subject by various authors and then gives the results of his own control experiments made with the Bordet-Gengou bacillus of tussis convulsiva. The cultures of the bacillus obtained by him from the sputum showed rapid growth upon a nutrient medium consisting of glycerin-agar with considerable addition of blood human. These cultures were very toxic for animals. When the culture medium contained only a small amount of blood, the virulence of the microorganism was diminished. That these infectious agents are specific for pertussis is rendered probable by the following: (1) In very small children who previously were free from affections of the lungs and respiratory passages, the bacillus was present in enormous numbers in almost pure culture in the sputum during the course of whooping-cough. (2) The blood serum of pertussis convalescents agglutinates the bacillus. (3) Fever and cough were produced in monkeys and dogs by infection with pure cultures of the bacillus (Klimenko); also animals which came in contact with infected animals sickened and manifested the same symptoms, and the same bacteria were found in their bronchial secretions. While other authors found the Bordet-Gongou bacilli only in the catarrhal stage and during the first to second week of the convulsive stadium, the author was able to demonstrate them even during the sixth to eighth week of the disease, although in small numbers.—*Post Graduate*.

THE PHILADELPHIA PEDIATRIC SOCIETY.

Stated Meeting, October 11, 1910.

CHARLES A. FIFE, M.D., PRESIDENT.

PURPURA.

DR. THEODORE LE BOUTILLIER showed a boy, aged two years, of Italian parentage, breast-fed for eighteen months, although table food had also been given since he was a year old. He had had cervical abscesses at nine and again at eighteen months. He has had attacks of purpura ever since he was six months old, lasting two or three days at a time. There has never been hemorrhage from any mucous membrane. Blood examination, September 26, 1910, showed hemoglobin, 15 per cent.; red blood cells, 1,600,000; leukocytes, 22,000; on October 6, 1910, hemoglobin, 25 per cent.; red blood cells, 4,128,000; leukocytes, 30,600. He has had severe nasal hemorrhages, but none since the last blood count.

DR. ELEANOR C. JONES referred to a case of purpura in a child which has, up to the present time, lasted six months, due to a streptococcic infection through the tonsils.

LEUKEMIA.

DR. LE BOUTILLIER also showed a boy, aged one year, who had had bronchitis when eleven weeks old. He is one of twins, breast and bottle fed, in poor hygienic surroundings. His spleen was noted as enlarged and palpable March 5th, with enlarged abdomen and marked pallor. He remained pale all summer. In September he had an attack of diarrhea, vomiting and some cough, moderate jaundice, large, tense abdomen, palpable spleen, two fingers' breadth below the costal border, large liver and edema of the scrotum. He was admitted to St. Christopher's Hospital for Children, October 1st. Blood examination, October 4th, showed hemoglobin, 40 per cent.; red blood cells, 660,000; leukocytes, 16,000; October 7th, hemoglobin, 35 per cent.; red blood cells, 445,000; leuko-

cytes, 24,100; and on October 10th, hemoglobin, 35 per cent.; red blood cells, 300,000; leukocytes, 28,000. Differential count gave polynuclear, 27 per cent.; mononuclear, 43 per cent.; lymphocytes, 28 per cent., and basophiles, 2 per cent.

DR. E. E. GRAHAM called attention to the importance of making more blood examinations in cases of malnutrition.

SPLENIC ANEMIA.

DR. J. CLAXTON GITTINGS showed a girl, aged twenty months, who had had intestinal indigestion since birth. Her abdomen had always been large; there was no evidence of syphilis. The mother felt the "lump" in the abdomen twelve days ago and brought her to the Children's Hospital, seven days ago, with moderate rickets, head sweating, flatulent, distended abdomen, liver enlarged 1 cm. below the costal margin and spleen, extending to the anterior superior spine of the ilium and to within 1 cm. of the median line. Blood examination, October 5th, gave hemoglobin, 55 per cent.; red blood cells, 3,460,000; leukocytes, 13,000; on October 10th, hemoglobin, 45 per cent.; red blood cells, 3,050,000, and leukocytes, 16,680. Differential count was: Polynuclear, 62.2 per cent.; large mononuclear, 4.6 per cent.; small mononuclear, 28.2 per cent.; transitional, 8.9 per cent., and eosinophiles, 4 per cent. in 13,680 leukocytes. She has digested her food well since admission and the blood findings thus far do not warrant the diagnosis of anemia pseudoleukemica infantum. The disproportion between the size of the spleen and the degree of the changes in the blood is the principal point of interest.

DELAYED CRISIS IN CROUPOUS PNEUMONIA.

DR. GITTINGS showed a boy of two years, whose only previous illness had been bronchitis last May. He became ill September 7th, suddenly, with vomiting, fever, malaise, dry, short cough, rapid breathing and loose stools. Examination on admission showed consolidation of the entire right lung. Crisis occurred on the twenty-second day, and since then the temperature has not exceeded 100° F. During the period of pyrexia the physical signs remained practically unchanged, while the consolidation has almost completely disappeared since the crisis. This case will be reported later in full.

TUBERCULOUS PERITONITIS.

DR. GITTINGS also showed a colored boy of eight years, whose illness had begun a month ago with dull abdominal pains, worse after eating and somewhat relieved by stools, which are semiliquid, about twice daily. He also suffers from anorexia and slight headache. The abdomen has been increasing in size. Examination reveals ascites, but no masses or enlarged liver or spleen. There is moderate rigidity and distinct generalized tenderness. Rectal examination is negative. His temperature ranges from 98° to 100°, occasionally 101°. The blood picture is that of moderate anemia; the urine is normal; X-ray of the abdomen is negative. Von Pirquet vaccination gave no reaction. The ascites has markedly decreased during the past three weeks and can now barely be demonstrated. Of especial interest is the history of the mother, having miscarried nine times on various occasions before and after the birth of this boy, the only child. No signs or stigmata of lues can be demonstrated in the boy. The Wasserman reaction has not yet been done.

CONGENITAL DEFORMITY OF THE THORAX.

DR. ARTHUR NEWLIN showed a baby, six months old, observed in Dr. Hamill's service at the Polyclinic Hospital. The child was born at full term, normal, non-instrumental labor; parents living and well; two other children well; no dead children; no miscarriages. The deformity of the back was noticed shortly after birth; the child is well, suffering neither discomfort nor inconvenience. Examination shows distinct enlargement to the left and continuous with the vertebral column, in the region from the twelfth dorsal to the second lumbar vertebra, an elevation of the spinal column extending to the left two inches. This is hard and firm, and the skin and subcutaneous tissues over it are somewhat thickened. The spines of the vertebræ seem to be in an approximately straight line. There is no tenderness, no sign of inflammation or fluctuation about the mass. Von Pirquet reaction is positive. The X-ray shows congenital abscess of the right half of the twelfth dorsal vertebra and the twelfth rib on the right side. The left half of the twelfth vertebra is shown as a small, wedge-shaped shadow occupying the space between the eleventh dorsal and the first lumbar vertebra on the left side. The absence of half of the vertebra on the right and the presence of the wedge-shaped piece of bone on the left produces a distinct angle that is well shown in the X-ray plate, causing the mass on the left side of the vertebral

column. On looking into the literature, Dr. Newlin was surprised to find that this deformity had frequently been noted by anatomists, in most cases in the lower dorsal or upper lumbar regions. Cases showing the absence of whole or part of different vertebrae with accompanying ribs in the lower dorsal region are not uncommon.

CONGENITAL HEART DISEASE.

DR. E. E. GRAHAM showed a girl of five years, first child, born without instruments, breast-fed for four months, walked at fourteen months, when she had bronchitis, at which time her heart disease was first noted. At nineteen months she had chicken-pox; measles at two and one-half years; lobar pneumonia, affecting the right lung, seven weeks ago, with crisis after almost three weeks. She is poorly nourished, below normal weight and height. The veins of the upper left anterior portion of the thorax are slightly distended; there is marked precordial bulging; when at rest respiration is 28; pulse is regular, small, 121 per minute. The lips are somewhat blue and pale, hands and feet are cold and fingers and toes are distinctly clubbed. Inspection shows a diffuse impulse in the mammary line in the region of the nipple; palpation shows an apex beat a half inch within, without and above this spot. Relative cardiac dullness extends almost to the right mammary line, to the second costal cartilage and to the left slightly beyond the mammary line. Absolute dullness reaches the lower border of the second rib and almost to the left mammary line. A loud systolic murmur is plainly heard over the entire chest, loudest to the left of the sternum at the second rib. It is much less distinct in the axillary line; also less distinct at the angle of the scapula than higher up in the back, between the scapula and the spinous processes. The right side of the heart is evidently enlarged, more laterally than vertically. Cyanosis is only present after exertion. The pulmonic second is normal. There is no thrill in the pulmonic region. Dr. Graham believes the most probable diagnosis to be defect of the ventricular septum, patent foramen ovale, with probable abnormal origin of the great vessels. He bases this diagnosis upon the comparatively slight cyanosis, the absence of a thrill, the hypertrophy of the right ventricle being sufficient to overcome the pressure in the left ventricle, the latter being little, if any, enlarged, thus maintaining a fairly good pulmonary circulation. The latency of the condition, the slight

cyanosis and the recovery from a severe lobar pneumonia make this case of exceptional interest.

DR. W. N. BRADLEY suggested the possibility of pulmonic stenosis.

DR. J. H. MCKEE referred to 3 somewhat similar cases which he had seen during the past year.

DR. GITTINGS said that transposition of the great vessels could also be inferred from the fact that the cardiac dullness extended as far, or even slightly further to the right of the sternum than it did to the left, and that the maximum intensity of the murmur seemed, to his ear at least, to be situated about midsternum rather than to the left.

AMAUROTIC FAMILY IDIOCY.

DR. KENNETH D. BLACKFAN reported a case of family idiocy showing certain skeletal changes of achondroplasia of an atypical type. When first seen the characteristics of achondroplasia were manifest clinically and X-ray pictures showed the skeletal changes of an atypical type. When the case came under observation, six months later, there were symptoms suggestive of amaurotic family idiocy and the ophthalmoscopic examination showed the pathognomonic picture of this condition. The skeletal changes of achondroplasia were even more marked than at the first examination.

CONGENITAL HYPERTROPHIC PYLORIC STENOSIS.

DR. HARRY LOWENBURG reported the case of a girl whom he had seen in June, then six and a half weeks old. Vomiting had begun at two and a half weeks and continued in spite of treatment. The baby lost weight, weighing 5 pounds, 7 ounces when seen. In spite of all efforts the parents refused operation until the child had lost more weight. When seven weeks of age Dr. Stewart performed posterior gastroenterostomy at the Pennsylvania Hospital. The pylorus was found absolutely impassible, thickened and hard. The stomach was enormously dilated and the intestines had completely collapsed. A small, hard tumor mass was found at the pylorus. The child did well at once and weighs 13 pounds at twenty-two weeks. Dr. Lowenburg then discussed the question of diagnosis and treatment in full.

DR. BRADLEY congratulated Dr. Lowenburg upon having the courage of his convictions; while we see some cases which suggest pyloric stenosis, making the diagnosis entails such heroic measures for relief that one must feel more than ordinarily the correctness of one's views. Posterior gastroenterostomy is the operation of choice in these cases, as the extremely small caliber of the pyloric orifice, as viewed postinotem or at operation, makes it almost absurd to attempt any form of pyloroplasty.

DR. GITTINGS thought that the amount of fecal matter passed in these cases is perhaps a more trustworthy index of obstruction than the frequency of vomiting. When the bulk of the stool is persistently minimal, it is of more significance than the cessation of the vomiting for twenty-four hours. The latter can occur in the presence of gastric dilatation when there is complete obstruction of the pylorus. These remarks must not be construed as an attempt to distract from the importance of spasm as a factor in many cases.

DR. LOWENBURG said that when the presence of a tumor cannot be definitely determined the question of operation is a difficult one to decide. The only way to decide is by making careful daily observations of the infant's weight and strength.

DR. ROSE HARRISON reported the case of an infant which died when five weeks of age, as operation was refused. Symptoms had appeared when the baby was two weeks of age. The autopsy showed hypertrophy of both mucous membrane and muscular coats of the pylorus and stomach. Only a fine steel probe could pass through the pylorus.

DR. BRADLEY said that he had seen this case two or three days before death. He had agreed with Dr. Harrison in urging operation, but the family had refused. At the autopsy he was impressed by the extremely narrow pyloric orifice, admitting only a fine probe.

DR. LOWENBURG thought that Dr. Harrison's case was one of those that should undoubtedly have been operated upon. Dr. Lowenburg does not believe that the fact that many of these infants retain nourishment for twenty-four hours excludes complete stenosis of the pylorus, but, on the contrary, this may be corroborative evidence of stenosis, being explained by the enormous dilatation of the stomach and the mis-statements of parents in their eagerness to avoid operation. The absence of curds in the stools is also important evidence of complete stenosis.

CURRENT LITERATURE.

ABSTRACTS IN THIS NUMBER BY

DR. CHARLES E. FARR. DR. C. D. MARTINETTI.
DR. S. FELDSTEIN. DR. FRITZ B. TALBOT.
DR. S. W. THURBER.

DISEASES OF EAR, NOSE AND THROAT.

FOWLER, EDMUND PRINCE: THE SERODIAGNOSIS OF SYPHILIS IN ITS RELATION TO DISEASES OF THE EAR. (*Annals of Otology, Rhinology and Laryngology*, June, 1910, p. 367.)

This article deals with the Noguchi modification of the Wassermann reaction and contains several tables. The statistics relating to children are interesting in showing that 15 per cent. of all chronic ear diseases show active syphilis. In the 66 children reported, 43 had enlarged tonsils and adenoids. Strongly positive reactions occurred in 10 per cent. of the children. Weakly positive in 21 per cent. In children a positive reaction is twice as prevalent in females as in males. The great majority of positive reactions occur in the suppurative diseases. S. W. THURBER.

MCCULLAGH, SAMUEL: REPORT OF 2 CASES OF LATERAL SINUS THROMBOSIS TREATED POSTOPERATIVELY WITH THE HISS EXTRACT OF LEUKOCYTES. (*Annals of Otology, Rhinology and Laryngology*, June, 1910, p. 387.)

The second case reported was that of a girl of eight years, on whom a simple mastoidectomy was performed on December 18, 1909. Sinus found involved and excised as was also the jugular vein. During the following four days the temperature ranged from 101° to 105° F., and the condition became progressively worse. On December 23d 10 c.c. Hiss extract administered and followed by a fall in temperature of 2°. On the 24th 20 c.c. were given twelve hours apart in doses of 10 c.c. each, resulting in yet a fall of 1° below the day before. On December 25th 10 c.c. given; patient much brighter. On the 26th the last injection was given, and two days later temperature was normal. The rapid clearing up of a toxic condition was most striking. There was no constant effect on the temperature in either case, for after some injections it went up.

S. W. THURBER.

PATHOLOGY.

KENDALL AND SMITH: A RAPID PRESUMPTIVE TEST FOR DIARRHEA CAUSED BY THE GAS BACILLUS. (*Boston Medical and Surgical Journal*, October 13, 1910, p. 578.)

The method consists essentially in inoculating sterile tubes of whole milk with a small portion of the suspected stool thoroughly emulsified in it, and immersed in a water bath to above the level of the top of the milk and heated to 80°C. for twenty minutes, incubating at body temperature for eighteen to twenty-four hours. As an alternative procedure the infected milk tube may be gradually brought to the boiling point of water in a water bath, kept there for three minutes, then incubated as above. By so doing, all bacteria not in the spore state are killed and the development of the spores into vegetative cells is unrestricted by the presence of non-spore-forming organisms. Those cultures containing gas bacilli present at the end of the period of incubation three prominent features: (1) The casein is largely dissolved (usually at least 80 per cent.); (2) the residual casein is slightly pink in color, and filled with holes, the result of the stormy fermentation; (3) the culture smells strongly of rancid butter, due to the formation by the gas bacillus of butyric acid. Gram-stained preparations made from such growths show rather thick, short bacilli, with slightly rounded ends. Controls suitably studied culturally have shown that cultures presenting this complex are, in reality, gas bacilli.

The writers have examined the stools from 231 infants presenting a variety of intestinal disturbances, and it was possible to isolate the gas bacillus from 22. It was not possible in any case in which the gas bacillus was recovered from the stools to isolate simultaneously the dysentery bacillus.

The diagnosis of diarrhea due to an infection with the gas bacillus can be made by the means described above within twenty-four hours, at the end of which time it is possible to begin treatment with a definite idea as to the etiology of the condition. The management of all acute diarrheas during this period of twenty-four hours, while the cultures are developing and while the diagnosis is being made, is practically the same, namely, purging and starvation.

Thus far the application of the method as outlined above and the subsequent treatment with buttermilk, has been limited to relatively few cases, but the results obtained have been uniformly

satisfactory and would seem to justify the belief that the gas bacillus is the etiologic factor in a small group of the acute diarrheas in infants.

Fritz B. Talbot.

SURGERY.

NEWELL, F. S.: TRANSFUSION IN CASE OF HEMORRHAGE OF THE NEWBORN. (*Boston Medical and Surgical Journal*, September 15, 1910.)

F. S. Newell transfused with the Elsberg cannula from the radial artery of the donor to the internal saphenous vein of the infant, the flow continuing for twenty-five minutes. The hemorrhages from mouth and rectum ceased at once and the infant made a perfect recovery.

CHARLES E. FARR.

ROBINSON, SAMUEL: ACUTE THORACIC EMPYEMA. AVOIDANCE OF CHRONIC EMPYEMA. RIB TREPHINING FOR SUCTION DRAINAGE. (*Boston Medical and Surgical Journal*, October 13, 1910, p. 561.)

The writer concludes as follows:—

Cases of purulent pleurisy may be divided into three classes—acute, subacute and chronic.

Suction or siphon drainage aids in the reëxpansion of the lung in all cases of the first group; in most of the second; probably in none of the third.

Suction, even though inefficient, is better than no suction, provided suction is constantly applied.

Prevention of leakage requires, above all things, an air-tight thoracotomy wound. This is best obtained by the rib-trephining method, with the application of a threaded metal tube.

The particular form of suction device applied to the air-tight wound will depend upon the means at hand.

Fritz B. Talbot.

SCUDDER, C. L.: CONGENITAL STENOSIS OF THE PYLORUS. (*Boston Medical and Surgical Journal*, September 15, 1910.)

C. L. Scudder reports 3 successful cases, all in boys, apparently well at birth. Vomiting, the first symptom in all three, appeared at from two to six weeks. Loss of weight quickly followed. All were cured by gastroenterostomy. The leading signs of obstruction are persistent tumor at the pylorus, visible peristalsis, continuous vomiting with loss of weight in a carefully-fed

nursing boy, under three weeks of age. Doubtful cases should be explored. Too great delay in operating is the cause of the high mortality.

CHARLES E. FARR.

BONN, M. MAKKAS: EXSTROPHY OF THE BLADDER. (*Zentralb. für Chirurgie*, August 13, 1910.)

M. Makkas Bonn recommends for this distressing condition segregation of the cecum and implantation of the ileum into the transverse colon and of the appendix into the lower end of the incision. The appendix is opened and the cecum irrigated daily through a catheter for a month. The ureters with a small portion of the bladder wall surrounding their mouths are then transplanted into the cecal wall. In the author's case, a child of twelve, the new bladder held 300 c.cm. and was emptied every three or four hours by catheter. There was no leakage.

CHARLES E. FARR.

MEDICINE.

STOELTZNER, W.: HYPOTHYROIDISM IN CHILDHOOD. (*Jahrb. für Kinderh.*, August 1, 1910, p. 149.)

There are almost as many cases of rudimentary as of fully developed infantile myxedema. The author reports 4 cases of hypothyroidism. In 1 case the most marked symptom was deficient growth in length of the bones, which was very favorably influenced by thyroid treatment. In 2 other cases symptoms of myxedema developed as a sequela of an acute infectious disease (severe measles in one case and mumps in the other). In the latter thyroid treatment was carried out for but a short time, and the condition remained stationary for two years. At the end of this period spontaneous improvement began, so that three years later, when the author had an opportunity to reexamine the patient, the stature and growth were once more normal. In the fourth case, arrested bodily growth and change in mental condition followed a fall resulting in a lacerated wound of the neck in the region of the thyroid. Thyroid therapy led to marked improvement in all the symptoms.

The author considers the lymphatic diathesis a manifestation of hypothyroidism. But under this term he would include those children who are not only obese but also flabby, bloated, pale and phlegmatic, suffer from enlarged tonsils and adenoids, and whose cerebration is slow.

S. FELDSTEIN.

HEINE, L.: PROGNOSIS AND SYMPTOMATOLOGY OF HEREDITARY LUES. (*Jahrb. für Kinderhk.*, September 1, 1910, p. 329.)

The mortality in 100 cases observed at Neumann's Clinic was 45 per cent., a mortality which was three times as great as in non-syphilitic children reared under the same conditions. The mortality of the illegitimate infants was 54.2 per cent., as contrasted with a mortality of 43.2 per cent. in the legitimate babies. Sixty-two of the infants were exclusively or partly breast-fed, and of these 38.7 per cent. died during the first year. Of 35 bottle-fed babies 54.2 per cent. died during the same period. There were 16 premature born infants, with a mortality of 62.5 per cent. The death rate in 84 full-term babies was only 41.7 per cent. The lowest mortality (25 per cent.) was found in the legitimate mature and breast-fed infants. In one-third of the cases death was directly attributable to syphilitic disease, the immediate cause of death in a majority of these cases having been convulsive seizures. Optic neuritis was found in 86 out of 105 cases, or 81.9 per cent.; this, therefore, represents the most frequent symptom of hereditary syphilis. In 79 infants the neuritis was bilateral. In 9 cases atrophy of mild grade was seen; in 3 others choked disc was present. Chorioretinitis was present in 7 cases. The prognosis as to the retrogression of the opticneuritis is good, as this symptom is rarely present in older children or adults. Enlargement of the spleen was present in 75.4 per cent. of the cases. Snuffles was observed in 73 per cent.

Continuous crying, especially at night, is a valuable symptom of hereditary syphilis. It not infrequently is the first symptom. The author attributes it to meningeal involvement.

S. FELDSTEIN.

THERAPEUTICS.

PONTICACCI, L.: MORPHIN IN THE TREATMENT OF CROUP. (*La Pediatria*, 1909, No. 2.)

Twenty-four cases of croup are considered, 6 of which required either intubation or tracheotomy. The remaining 19 were treated with morphin hypodermically, 1 to 3 mg., according to age, being given. The drug was well tolerated, but did not appear to give immediate results. Its value lies in the comparative quiet that ensues in cases treated with serum, which allowed the serum to act thoroughly. The author admits that his investigations are not conclusive.

C. D. MARTINETTI.

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ORIGINAL COMMUNICATIONS.

THE NEED OF MORE COMPLETE REGISTRATION OF BIRTHS.*

BY J. H. M. KNOX, JR., M.D.,

Associate in Pediatrics, The Johns Hopkins University, and President of the
American Association for Study and Prevention of Infant Mortality.

I make no apology for bringing the subject of birth registration before this distinguished body, for it is one in which the Pediatric Society should be deeply interested. Our membership is made up of those who in this country are supposed to have most accurate knowledge of the physical necessities of the infant and of the factors influential in its individual weal and woe, and it would seem that, possessed of this knowledge, the American Pediatric Society has a peculiar responsibility to take a leading part in the rapidly spreading movement to lessen the influences which are at present operating before, during, and throughout their first

* Read before the Twenty-second Annual Meeting of the American Pediatric Society, Washington, May 4, 1910.

year to diminish the vigor and destroy the lives of so many infants. We know as do few that a death-rate of 20 per cent. under one year can be reduced at least one-half by properly directed effort, and this very knowledge carries with it an overwhelming duty to the communities in which we live and to the country at large.

The investigation of infantile disease in the laboratory and at the bedside should lead to better methods of preventing illness and death among all babies. It is quite possible, however, that one who is fully occupied in private work may fail to see the relationship between private practice and the needs of the infants in the whole city. Some knowledge of general statistics is necessary therefore to revise the impressions that we receive from a limited horizon.

Accurate information concerning an epidemic of measles, for example, is of more importance to the public than the results of any one man's experience with the disease. Knowledge of the incidence of and mortality from various ailments can only be derived from a study of general vital statistics and cannot be acquired by collating the recollections of a single life or institution.

This being true, we must face the fact that we have no complete national vital statistics. For only about 55 per cent.¹ of the population in seventeen states is there any registration of the number and cause of deaths. In no single state or city in this country is the registration of the births complete, and in but a few isolated states and cities is there any law on the subject which is properly enforced. The United States Census Bureau calls attention to the fact that elaborate and carefully worked-out systems record the birth, entire career, and death of every pedigreed horse, cow, and even blooded cats; yet children are born, and men and women die, without the slightest official record of these events being preserved. This indifference to record-keeping is perhaps to be expected in a new country in its formative period, but surely the United States has long since emerged from this chaotic condition. Its influence is said to be powerful among the nations of the world, and yet it is neglecting a very fundamental quality of self-respect, a knowledge and appreciation of its own most valuable possession—the lives of its citizens.

Vital statistics which reach a high standard of excellence are published each year from the following countries:³ England and Wales, Scotland, Ireland, Australia, Tasmania, New Zealand,

Ceylon, Jamaica, Denmark, Norway, Sweden, Russia, Finland, Germany, Austria, Hungary, Roumania, Bulgaria, Servia, Netherlands, Belgium, Switzerland, Spain, Italy, Japan, Chili; and to this list should probably be added Mexico, the Argentine Republic, and other countries in South America. The United States as a whole is not represented in international vital statistics. The difficulties are partly inherent to our form of government, and their solution will depend upon a thorough understanding between the several states or some uniform federal regulation. Behind all this, however, lies the persuasive power of public opinion, long dormant and unresponsive to this important subject. Until the public learns that it is essential for the best well-being of any complex civilized community to know the number, character and condition of its citizens, the fewer laws the better.

Some states not belonging to the registration area have had half a dozen general laws for collecting vital statistics, any one of which could be known to be a certain failure from the time it was enacted. As Professor Reinsch remarks,² "the amount of legislation in the several states as compared with that in other civilized communities is astounding. Many laws are passed which do not have a strong public sentiment behind them, or the enforcement of which is not properly provided for."

This paper is not a brief for *more* law, but a plea that we may aid in convincing the public that to sustain our self-respect among the nations as well as for other reasons, some of which may be mentioned, there must be an official permanent record of every birth which occurs in the country. From the legal point of view adequate registration of births is often of great value. It is frequently necessary to establish the date of birth of an individual before he can obtain certain property or secure a pension. It may determine the direction of an inheritance. In some states it may be needed to establish the right to vote, for jury, army, or navy service, for marriage abroad, often for even residence abroad, and to prove the age of consent (I am told that it is very difficult to convict a man accused of offence against a girl whose age cannot be proved by a birth certificate), to determine the real age in respect to child labor laws or school attendance, or in some cases to establish an identity. These are but a few of the many reasons why the lawyer would welcome uniform and complete birth registration. In lieu of this definite information all sorts of substitutes have to be made use of. One pension claim was established

because there was a record of the foaling of a noted race-horse synchronously with the birth of the claimant. Many other probably just claims have remained unpaid because there was no positive knowledge of the time of birth.

"There is hardly a relation of life,"³ says Dr. A. R. Reynolds, "from the cradle to the grave, in which the evidence furnished by an accurate registration of births may not prove to be of the greatest value. As the country becomes more densely settled and the struggle for existence sharper, many of those matters which hitherto have been of minor significance will take on deeper meaning and acquire greater importance. Hence the urgent necessity for remedy of the defects which prevent a proper registration of births."

Dr. Fulton⁸ points out that "the interest of the citizen in registration of births is indeed superior to his interest in the registration of deaths, for a greater proportion of the privileges and immunities, rights and duties, turning upon the question of his age and his parentage, are definitely conserved by the registration of his birth."

But apart from and in addition to the importance of this matter from the legal point of view, there are even more urgent reasons that prompt registration of births with the proper authorities should be championed by every physician, particularly by those most interested in child life. I may mention several. First, accurate birth registration is the only means we have of determining the number of babies under a year in any community, and until we know this our discussion of the tremendous problem of infant mortality is more or less successful guesswork. Nearly all the writers in this country who have discussed the question have based their deductions upon foreign statistics or upon those of a comparatively small number of cities or communities. The latter, in the opinion of the experts at the Bureau of Vital Statistics, are very unreliable. The same is true of the census returns. The infant birth rate in the United States is not known, and hence the number of the infant population can be the subject only of conjecture. Such questions as these await solution: What proportion of infants born die within the first week of life? How many die of over-lying, of neglect, of gastrointestinal disease, from any cause, in proportion to their whole number? We do not know. In every other civilized country this vital information is at hand for the asking. Here we must imaginatively gen-

eralize from a paucity of statistical facts, or draw upon our own limited experience.

Again, would it not be well to have a prompt record of births, that the authorities could detect and treat ophthalmia neonatorum ere it is too late, and so prevent many of the cases of blindness that are crowding the asylums? More than half of the babies in this country are ushered into the world by midwives, but few of whom have had any training in surgical cleanliness. Their cases particularly need official oversight.

Again, it would not be nearly so difficult to get in touch with the mother, to encourage breast nursing, advise as to proper clothing, and adequate ventilation for the baby, if notification to the proper authorities followed immediately after its birth. Many of the infants at the various medical and milk dispensaries come for the first time after weeks of illness, much of which could be avoided if the news of the arrival had been known.

If we have any duty to the children born out of wedlock, which so greatly swell the institutional mortality rate, it can be best performed by insisting on speedy registration, followed by competent advice and assistance. France first discovered the baby through birth registration. Again, is it not of the utmost importance in this country, whose population is made up of so many mingled elements, to be conversant with the vital statistics of each race in its new environment, to know the birth rate and the death rate, and the cause of death for every type of population, whether Irish, German, Slav, or African, Jew or gentile, native born, and in all parts of the country, inland or coast, prairie or mountain, and under differing home and industrial conditions and walks in life? With all these facts the science of demography has to do, and it depends upon birth registration as its very foundation stone.

At the rate of progress we are making, according to Dr. Cressy L. Wilbur, our best authority on this subject, we can hardly expect to secure complete birth registration covering the whole country until the year 2,000, but surely we shall not be satisfied with such delay in obtaining such facts, so essential to our national self-respect and to the well-being of our citizens. Already a forward step has been taken by the Bureau of the Census operating with a committee of the Public Health Association in the drafting of bills⁴ containing the essential requirements of registration for submission to the several states. It is hoped that this will prevent

the waste of effort in enacting useless laws, as well as to supply a guide for efficient legislation.

Some of the necessary provisions for registration of births are:—

(1) They must be registered immediately after their occurrence.

(2) Certificates of birth should be required.

(3) Some check is necessary to secure enforcement of the law. A fine for failure to comply, and a reward for the officers detecting the delinquent.

(4) A central registration office and efficient local registrars.

(5) The responsibility for reporting births should be fixed.

It is the fact of registration and not the nature of the machinery by which it is obtained that is the goal to be reached. Certainly physicians have been most recreant in their duty. In Baltimore, in spite of a fairly good law, not more than about half of the births are reported. If the relationship between the number of deaths and the number of births was as statistically reported, our city would be gradually depopulated. Possibly in many communities better results could be obtained if the Liverpool plan were adopted and the responsibility laid upon the father of the child if residing in the house, or upon the person attending the mother. This person is simply required to notify the authorities of the *fact* of the birth within six hours through blanks and postage furnished. The remaining data is obtained by the health officer. Surely the subject is one of the first importance for many considerations, some of which have been touched upon. No body of men exert more influence to secure adequate birth registration in this country than the members of this society. When we follow the obstetrician in the treatment of the newly-born infant, can we not see that its birth is duly recorded, and in general, as experts and as public-spirited citizens, let us labor to remove this reproach to the intelligence of a great nation.

THE SO-CALLED THYMUS DEATH.—J. P. C. Griffith (*New York Medical Journal*, September 4, 1909) enumerates and discusses the various theories which have been advanced to explain sudden death from enlarged thymus. They fall under four general heads. . . . The writer mentions a family of nine, all of whom died suddenly in childhood with almost identical symptoms; autopsy was performed on one of them, and an enlarged thymus was the only thing found which could explain the death.

NASAL DIPHTHERIA.*

BY EDWIN E. GRAHAM, M.D.,
Philadelphia.

In considering the subject of nasal diphtheria it is important to remember that the Klebs-Loeffler bacillus may produce only the slightest irritation and discharge, no membrane being present; or it may produce the most intense inflammation with swelling and edema and membrane so extensive in amount as to more or less completely block the nares. The amount of contagion is usually in direct proportion to the amount of discharge from the nose and nasopharynx. However, diphtheria may be, and not uncommonly is, spread from a case where little or no discharge is present, and yet Klebs-Loeffler bacilli in small or large numbers, and virulent, may be demonstrated as present in the nose.

When one considers that these cases are apt to be overlooked; are not ill enough to wish to be confined to bed or within certain room or rooms; have perhaps very slight local manifestations and no constitutional symptoms, it is not to be wondered at that parents fail to see the necessity for strict isolation, and that a more or less casual examination by the physician does not disclose the real nature of the affection; and as membrane is more commonly limited to the posterior than to the anterior nares its presence may be overlooked.

Such cases are often the focus from which epidemics in a school or hospital ward may have their origin, and, while perhaps not dangerous to the infected individual, are a great menace to the community. It is impossible to say in any given case how long the contagion may exist, whether a severe inflammation with membrane and profuse discharge is present, or a mild case with slight angina and no membrane; but it is absolutely necessary, for the safety of others, that all such cases should be isolated until no local manifestations remain, and all the diphtheria bacilli have disappeared.

If, however, as will occasionally happen, the bacilli are found for more than a reasonable time, say two weeks after all local evidences of the disease, such as membrane, inflammation and

* Read in Philadelphia, November 8, 1910, before the Joint Meeting of the Philadelphia Pediatric Society and the Section on Pediatrics of the New York Academy of Medicine.

discharge, have disappeared, then it is quite possible that these bacilli are not virulent and a guinea-pig should be inoculated, to test their virulence. It is also necessary to draw particular attention to the fact that it is often extremely difficult to distinguish between the true and pseudodiphtheritic bacillus, many bacteriologists claiming that it is often impossible to do so. If inoculations with guinea-pigs were more commonly carried on, and thus the virulent Klebs-Loeffler bacilli separated from those non-virulent, and the true bacilli from the pseudobacilli, there would be a more earnest desire upon the part of physicians at large to coöperate with health boards in the reporting of cases, and many cases would be released from an unnecessary and uselessly prolonged quarantine. In considering the length of quarantine it is well to remember that diphtheria bacilli may often retain their virulence for at least four or five months outside the human body.

The nose may be infected through the anterior nares. These are the cases where the infection is most likely to be limited to the nose. Both sides are more often involved than one side alone. The involvement of the sinuses and the antrum of Highmore may explain the persistence of, and the difficulty of, removing the bacilli in certain nasal cases.

Only those cases will be considered in this paper that show an involvement of the nose alone. The paper does not include cases where pharyngeal, tonsillar or laryngeal diphtheria is present.

Mild cases may be described as those with few or no constitutional symptoms, little or no membrane, very little nasal discharge.

Moderate Cases.—Slight constitutional symptoms, persistent and often copious nasal discharge, which may be purulent and blood-streaked, excoriating the upper lip. It may persist for several weeks and yet the child be in apparently very good health. Membrane is usually present.

Severe Cases.—The nares are obstructed and the child breathes with difficulty through the nose, the mouth is kept open, respiration is labored, the tongue dry. Membrane can be easily seen and small or profuse nasal hemorrhages may occur. The discharge often has a decided odor. The submaxillary and glands at the angle of the jaw are swollen and a distinct toxemia may exist. The child is asthenic, the pulse is

rapid, weak and perhaps irregular; there is stupor and decided anemia. The blood shows a reduction in red cells and of hemoglobin, the reduction being in proportion to the severity of the case. There is usually a leukocytosis.

The temperature is, as a rule, moderate—100° to 101.5° F. Albumin is usually present in the urine in severe cases. Hyalin and granular casts are present, but not in large numbers. Dropsy is uncommon. Nausea, vomiting and diarrhea are often present. A moderate amount of delirium is quite common. The membrane disintegrates slowly; it may be dislodged in a large cast or mass by a violent sneeze. The local and constitutional symptoms lessen rapidly with the disappearance of the membrane. The anemia and evidences of a weak heart are, however, usually slowly recovered from.

The membrane which appears in the nose in most cases of scarlet fever and measles is not commonly diphtheritic, especially if it occurs early in the disease or during the height of the disease. Membrane occurring in the later stages of measles or scarlet fever is often diphtheria, and, if diphtheritic, the inflammation of the surrounding mucous membrane is, as a rule, not severe.

As a diagnostic aid it is well to remember that the membrane in diphtheria may be found only in the nose; membrane not diphtheritic is rarely so limited. Albumin in the urine is suggestive of diphtheria, but if the case is a mild one, and no toxemia exists, albuminuria would, of course, not be expected to occur. Paralysis, especially regurgitation of liquids from the nose, would be in favor of diphtheria.

A cover-glass smear will often enable one to quickly make a diagnosis, but a culture is more accurate, and as the local and constitutional symptoms are usually very mild, a culture is much to be preferred. Klebs-Loeffler bacilli may disappear early in the disease, and may not be found when the membrane has largely disappeared. If membrane is present all bacilli, which culturally and morphologically are diphtheritic, should, in my opinion, be considered true diphtheria bacilli, unless proven pseudodiphtheritic by inoculation of a guinea-pig.

Any child who is shown to have diphtheria bacilli in the nose, even if it presents no clinical evidences of the disease, is a possible source of danger, and the child should be isolated until the bacilli are proven to be non-virulent. Children exposed to diphtheria are known to have occasionally the bacilli in the nose,

and animal inoculations prove that these bacilli may be virulent, and yet these children may not clinically develop diphtheria. Children in bad hygienic surroundings and in institutions show particularly this tendency to harbor the bacillus, and to have the disease develop into clinical diphtheria and to spread the disease to other children, to a much more marked degree than where the conditions from a hygienic standpoint are first-class.

In a doubtful case, especially if the child has been exposed to diphtheria, and a nasal discharge persists, a single negative culture is not positive proof that the case is not diphtheritic.

An interesting question, and one which requires much careful future study, is the report of return cases. I believe that future investigation will conclusively prove that return cases occur in a greater proportion of instances than is now believed, and I do not approve of the doctrine that a child discharged from quarantine with diphtheria bacilli in the nose, who is clinically free from diphtheria, is, as is claimed by some careful observers, not able to transmit the disease. In fact, one hears continually from physicians abuse of health boards because two successive negative cultures must be obtained before the child is allowed out of quarantine. What is the risk incurred by children who come in contact with this child who has been clinically free from diphtheria for some days, and who, nevertheless, has Klebs-Loeffler bacilli present in the nose? Is one warranted in sending these cases out from private homes and hospitals without inoculating a guinea-pig to test the virulence of the bacilli? Return cases to hospitals do not show a very large percentage of infections from such patients. C. B. Ker, of Edinburgh, states that "Dr. Cameron found that 1.2 per cent. of the total diphtheria cases were, after their discharge from hospital, supposed to have infected persons with diphtheria."

It is an interesting point, and one well worthy of discussion, as to how many of these return cases are real infections from the discharged case, and how many are cases of coincidence; by that I mean, happened to contract diphtheria at this special time from a source other than the discharged patient, but contracted it just at the time when it would appear that infection had occurred from the discharged case. It not uncommonly happens that a second child from a family is admitted to the hospital a few days *before* the first child is returned home. If this second child had entered the hospital a few days after, instead of a few

days before the first child was returned home, it would have been classed as a return case. However, there is no doubt in my mind but that all such cases with diphtheria bacilli in the nose, all clinical evidences of the disease having disappeared, are possible sources of danger.

We, of course, all agree that a public funeral should not be allowed in the case of a child who dies of diphtheria. If an epidemic exists, schools should be closed until the buildings have been thoroughly disinfected. That children may be carriers even if they clinically have not the disease. As many of the cases as possible that develop in the tenement and poor districts should be sent to the Municipal Hospital. All carpets, upholstered goods and bedding should be thoroughly disinfected by the city authorities, and home methods of disinfection should not be trusted.

Every suspected case of nasal diphtheria should be quarantined and isolation continued until a bacteriologic examination proves the case to be non-diphtheritic. Cultures should be taken from all exposed children; and those showing diphtheria bacilli should be isolated and the nose and throat appropriately treated.

In nasal diphtheria the bacteria may show an unusual tendency to persist, and it is believed this may be due to the nasal sinuses and antrum being involved. The danger of harboring virulent bacilli in these cases of long standing is not very great; the bacilli are usually few in number, and experience proves that the amount of contagion is comparatively little. It is unwise to admit into a hospital ward or institution any child who shows a membrane in the nose or has a nasal discharge, unless a bacteriologic examination has shown the absence of diphtheria bacilli; and all children in hospitals or institutions should be carefully watched for the development of such symptoms. It has been the experience of almost all physicians with hospital experience to see epidemics of diphtheria in hospitals originate from such cases. The number of visiting days and the number of visitors to children's wards should be limited as far as possible, and no children should ever be admitted as visitors. All visitors, and, in fact, all persons entering a children's ward should wear a sterilized cap and gown. Such a rule has been inaugurated at the Jefferson Hospital, and, I believe, is of decided aid in preventing outbreaks of the disease.

All children who have been exposed to diphtheria should receive an immunizing dose of 100 to 1,000 antitoxin units, the dose

being in proportion to age. It is doubtful, in my opinion, whether it is advisable to repeat this dose of antitoxin in institutions, as has been recommended by many physicians. Better clean out the wards; send to their homes all the patients who are clinically and bacteriologically free of the disease. Children who, from the nature of their illness, cannot be sent home may be transferred to a small isolation ward. The wards may then be disinfected, cleaned and aired and the patients be readmitted and the isolated children returned to the general ward. In this day and generation a ward that requires the regular administration of antitoxin every few months should not be tolerated, unless in a contagious disease hospital. Physicians and nurses should always wear cap and gown when in the sick rooms; all nasal discharges should be destroyed, and antiseptic gargles and sprays should be used frequently by all coming in contact with the patients. Absolute cleanliness should be insisted upon.

If the discharge is small in amount and there are no constitutional symptoms, it is unnecessary to irrigate the nose. In those cases where the discharge is abundant and the nasopharynx is more or less blocked with secretions, it is important to keep the nose and nasopharynx cleansed with warm, mild antiseptic solution. Normal salt solution, weak boric acid solution, 3 grains to the ounce, or borate and bicarbonate of soda, 5 grains of each to the ounce, may be used. All solutions should be used warm; no unnecessary force should be used, and the child should always be firmly wrapped from head to foot in a blanket. As the treatment is designed to especially wash out the nasopharynx, the fluid entering a nostril should escape from the opposite nostril and the mouth. A fountain syringe, in my opinion, is better than a piston syringe. Enough fluid should be used to at least fairly well cleanse the nose and nasopharynx. It is rarely necessary to employ irrigation oftener than once in four hours. Nasal hemorrhage calls for great care in the use of the syringe, and unless the case urgently demands syringing, it is better to discontinue it, if hemorrhage has occurred.

Antitoxin should, of course, be given in every case of nasal diphtheria, and, of course, the earlier it is given the better the result will be. In an infant it is dangerous to wait until a diagnosis can be confirmed by a bacteriologic examination. In older children with only slight nasal discharge and no toxemia one may postpone giving antitoxin until the bacteriologic examination con-

firms the diagnosis. To postpone the early use of antitoxin in a case of profuse nasal discharge, with membrane present, is, in my opinion, utterly inexcusable.

Hoffman's bacillus is considered by some as being not without its dangers, and as possibly being a weakened form of the diphtheria bacillus. The drainage and milk supply should be carefully investigated, and the routine inspection of school children is one of the most efficient means of preventing school epidemics.

Large doses of antitoxin are to be preferred under certain conditions to small ones, large amounts being required to neutralize the harmful "toxin" and the so-called "toxone." The latter is supposed to be responsible for the paralysis and is only loosely taken up by antitoxin, and not taken up in any great degree until all the "toxin" has been neutralized. This hypothesis seems to explain why antitoxin exerts a less favorable effect upon diphtheritic paralysis than one would perhaps expect.

Bronchopneumonia is, of course, commonly associated with the streptococcus and pneumococcus. But recent studies have proven that the diphtheria bacillus is more commonly than formerly supposed the cause of bronchopneumonia, and it may be the sole cause. Pneumonia has been produced in rabbits by the Klebs-Loeffler bacilli inoculated into the larynx. Large doses of antitoxin have proven of marked benefit in some of the pneumonia patients, and it is well to give the child the benefit of the doubt in appropriate cases.

In the present state of our knowledge should anaphylaxis influence in any degree the giving of diphtheria antitoxin? Elmer E. Heg, in an article on "Review of Theories of Anaphylaxis" in *Northwest Medicine*, writes: "As we all know, quite a number of sudden deaths have followed the use of diphtheria antitoxins, a number of them in cases of asthma, though some without history of asthma. In most, no history is given as to whether or not a previous injection of serum had ever been given. Goodall reports 90 cases in a children's hospital, of which, during a period of five years, there was a record of a second injection after the incubation period. Sixty gave evidences of reaction, mostly a rash of more than usual severity; 7 had severe symptoms; 1 convulsions; 2 collapse, and 7 had chills and temperature as high as 105°F.; all recovered."

Much literature has accumulated on the theories, phenomena, lesions and mode of death in anaphylaxis in the lower animals,

but one has some difficulty in finding much in literature regarding the serious results of anaphylaxis in man.

C. B. Ker, of Edinburgh, advises caution in the administration of antitoxin in the treatment of relapses. He says: "Some caution should be exercised in the administration of antitoxin in the treatment of relapses. It is, on the whole, wiser to withhold serum if it has been given during the original attack. Owing, doubtless, to what is termed 'anaphylaxis' the sequelæ of antitoxin are much more severe and much more frequent than we are accustomed to see in a primary case. Very profuse and irritating rashes, severe joint pains, and smart febrile reactions are all liable to occur early. A relapse is usually, though not always, comparatively mild, and, if there is not much evidence of toxemia and the larynx is not implicated, the serum can be dispensed with. I never hesitate, however, to give liberal doses if the symptoms are in the least urgent."

Dr. E. H. Funk has given me some interesting data from the Municipal Hospital in Philadelphia. During a period of some months he had an opportunity of seeing all the children in the scarlet fever hospital, and during a similar period all the children in the diphtheria hospital. All children in both of these hospitals are given one or more doses of antitoxin, and the curative doses are large ones. In the aggregate, a number of these cases have previously received either immunizing or curative doses of antitoxin. Some children are known to have been given antitoxin on three different occasions, the intervals between the administrations being months or years. Rashes, joint pains and slight febrile disturbances were occasionally seen, and yet no symptoms of a serious nature were ever observed.

A very unusual opportunity has been offered to study the results of repeated injections of antitoxin at the Widener Memorial School for Crippled Children in Philadelphia. Dr. Albert D. Ferguson and Dr. William J. Merrill have kindly furnished me with the following data: From 60 to 90 children are in the home, the building being all modern and thoroughly up-to-date. Many of these children remain for years as inmates. In spite of all precautions an occasional case of diphtheria occurs. An immunizing dose of 1,000 units is always given to all children who have been exposed, and large curative doses are administered. As a result of this policy, and the fact that children often remain for years in the home, it has happened that many children have

received a number of doses of antitoxin at intervals of a few months. It is understating the case to say that many children have received diphtheria antitoxin on at least six different occasions. Rashes, joint pains and slight fever are occasionally seen, but no fatal case, or even alarming symptoms, have ever occurred. It seems only just to conclude from this that with our present knowledge one should disregard completely anaphylaxis in treating diphtheria cases, and use antitoxin, according to modern ideas, at the earliest possible moment both for immunizing and curative effects.

Future study is required to explain the symptoms in certain cases. Several cases have been reported where physicians, taking an immunizing dose of 1,000 units, have had marked symptoms, such as unconsciousness and severe rash.

To those who are influenced by anaphylaxis it may be pointed out that the concentrated serum is safer, inasmuch as a smaller measure by quantity is required. And as the intravenous injection gives a more marked and rapid result, the subcutaneous method is to be preferred since the dangerous symptoms develop soon after the injection is given, and it is reasonable to suppose that the slower absorption of the subcutaneous method is safer therefore than the intravenous.

A conservative and safe method has been advocated, which should appeal to physicians and be applicable to a large number of cases; in fact, could be used in all patients, except where the symptoms were so urgent that a delay of a few hours might be dangerous to the life of the individual. This consists in giving a small initial dose of antitoxin, about the usual immunizing dose, in all cases where a previous injection of antitoxin has been administered. If no immediate reaction is observed, it is safe in a few hours to administer the remedy in appropriate curative doses. If the case shows an immediate reaction it is immune to the administration of the larger doses, which may be given with safety. If the immediate reaction has occurred, the patient will have milder symptoms from the smaller dose on the theory that the larger the dose the more severe the immediate reaction.

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(Discussion of this article on p. 939.)

THE VALUE AND LIMITATIONS OF THE EMPLOYMENT OF COLD AIR IN THE TREATMENT OF ACUTE RESPIRATORY CONDITIONS.*

By J. P. CROZER GRIFFITH, M.D., PHILADELPHIA,
L. E. LAFÉTRA, M.D., NEW YORK,
AND OTHERS.

OPENING OF DISCUSSION BY DR. J. P. CROZER GRIFFITH.

DR. GRIFFITH.—In entering into the discussion of this subject it is important to formulate a clear idea of just what is meant by the "cold air treatment," and the question raised whether we do not mean rather the *fresh* air treatment. Cold air may be conceived of as acting in several different ways. First, it may reduce the temperature of the body suffering from fever. In this manner its action will be much like that of the cold bath. But, inasmuch as the person treated in the cold, open air is very carefully wrapped up and protected from chilling, this action is evidently not the one desired or obtained. Secondly, there is the possible effect of the breathing of cold air. Whatever the reflex action may be of the cold air upon the nasal and laryngeal mucous membrane—and I do not think that this is of great importance—it is evident that the cold air can have no direct effect upon the lungs, inasmuch as in the ordinary process of breathing the air is warmed before it reaches these organs. Thirdly, there is to be considered the breathing of *fresh* air, *i.e.*, constant out-of-door exposure to the air, whether this be warm or cool. This last is the subject to which so much attention has been given. The fact that the cool air of winter employed in this way has more benefit than the very hot air of summer is not, I think, due to any difference in their character as inhaled, but dependent upon other conditions, such as the general depressing effect of heat upon the system.

The value of this fresh air treatment is undoubted, but it is to be borne in mind that the treatment is in no way new. Its employment for phthisis particularly has within the last few years undergone a very wide extension, but it has been used for this purpose for many years. More recently it has been applied also to other respiratory diseases, even in children, as especially in pneumonia; and it is of undoubted value also in many other conditions, notably malnutrition in infants, and the like. Did time permit I could refer to many cases in my own experience which would duplicate, undoubtedly, others in the experience of all of you—several children, for instance, in different families, whom

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I have over and over again treated for colds in the heads and throat for years, until they commenced to sleep out of doors, when their tendency to colds disappeared. One of the most interesting instances, however, was the following: A little child of about two and a half years of age, with empyema, was operated on in the hospital of the University of Pennsylvania. He failed to gain in health until he was given the open-air treatment in the sun-parlor, when his progress was rapid. For some reason it was necessary to place him again in the ward, when retrogression of health commenced until I was able again to have him return to the sun-parlor, when improvement at once began again.

Useful, however, as this treatment is, I am convinced that it can be overdone, and there is, I think, danger that in our natural enthusiasm for what seem to be new and useful procedures we may lend to this a too unqualified approval. Our cases should be carefully selected. Unquestionably many delicate infants do not well bear exposure to very cold air. Some children with bronchitis, for instance, are undoubtedly helped more by confinement to rooms with very uniform and rather warm temperature, in the manner which was considered the only way some years ago. I do not mean, of course, that the air in these rooms shall not be changed with sufficient frequency. Often, too, bronchitis will be more rapidly cured by such procedure combined with the filling of the room with water-vapor, medicated or otherwise. This is an experience which has repeatedly come to me.

As I have intimated, it is often difficult to tell just which case should receive one plan of treatment and which the other, and, indeed, the choice can be often only empirically made. On the whole, however, I believe that the exposure of children with respiratory diseases to open air, whether warm or cool, is a very great addition to our treatment of disease in early life.

DR. L. E. LAFÉTRA.—In the discussion of this topic it would be of the greatest assistance to know the physiologic action of cold air upon the various parts of the respiratory tract, not only directly, but also reflexly, through the medium of the nerve supply of the face and the nares. Unfortunately, I have been unable to find anything written upon this phase of the subject. The direct effect of the cold air inspired through the nostrils can hardly go further than the back of the pharynx and upper aperture of the larynx, being warmed to body temperature and saturated with water vapor by its passage through the nasopharynx. The primary effect of the direct application of cold to the skin is to stimulate the contraction of the blood vessels and lessen congestion of the parts; prolonged application has the secondary effect of producing relaxation and stasis. In the breathing of cold air, as compared with warm, there would seem to be only the difference of the greater amount of heat and moisture required in the nostrils for raising the inspired air to body temperature and saturation. There is no prolonged application of cold—ex-

cept, perhaps, to the face—since with each expiration there is the passage of warm, moist air over the nasal mucous membrane. With the remainder of the body kept warm, the cold air can affect only nerves of the face and nasal mucous membrane, and in this way reflexly the circulation and the caliber of the bronchial tubes and also the muscular tone of the larynx. The dryness of the air also has an effect as far as the larynx. Clinically, we know that the inhalation of warm, moist air relaxes the larynx and the bronchial tubes and promotes secretion; we know clinically, also, that cold, dry air, in the acute congestive stages of laryngitis and bronchitis is apt to produce spasm of the larynx and contraction of the bronchial tubes.

For the purpose of gaining all the advantages of the tonic effect of cold air in the treatment of hospital patients, Dr. Holt established, three years ago, at the Babies' Hospital, a "cold ward." The temperature in this ward was kept at about, and not over, 50°F., from November to April. Next to this cold ward is a regular ward, kept at a temperature of 68° to 70° F. In connection with this ward there is a steam room for administering vapor inhalations. Both wards have ten beds and have southern exposure. Into the cold ward have been put especially cases of lobar pneumonia, bronchopneumonia, empyema, pulmonary tuberculosis, bronchitis; also cases of rickets, malnutrition and of anemia. The number of cases in the cold ward was 50 the first year, 62 the second, 67 the third and 20 the fourth, this last number being smaller on account of the development of measles in the ward. Altogether, about 200 cases of the general classes mentioned were treated in this ward. There would be no advantage in detailing the statistics of the cases, nor of their mortality, since the cases differed so greatly. More important are the impressions gained by watching the effect in individual cases.

The advantages of the cold ward as regards the pneumonia cases are most marked in reducing the irritability and restlessness, promoting sleep, lessening the dyspnea, with the lowering of the respiratory and heart rate. These effects were most marked in cases of frank lobar pneumonia with high temperature and little or no bronchitis; less marked in bronchopneumonia. The good effects on the feeding and anemia cases were seen in increased appetite and improved assimilation.

Cases that had developed laryngitis or sibilant piping râles were not benefited, and with 3 patients in particular removal to the warm ward with or without steaming was followed by distinct improvement. These cases were the following:—

CASE I. Annie B., thirty-two months, bronchopneumonia, admitted December 28, 1909, to the cold ward, temperature, 50°F. The dyspnea increased so that same evening the child was transferred to the adjoining warm ward, temperature 70°F. The physical signs in this case were some dullness of right lower chest, with feeble breathing and very abundant fine, moist râles. There was considerable dyspnea. Child was cured in five days.

CASE II. James K., nine months, admitted December 24, 1909, with bronchopneumonia, temperature 103° to 105° F.; sent to cold ward. Kept in this ward for five days, but breathed with difficulty, so was moved to warm ward and steamed. The change was followed by improvement, but the child developed a retro-pharyngeal abscess, otitis media and tetany with laryngismus, so he died two weeks later.

CASE III. V. B., postoperative empyema. The child was put in cold ward, but got very blue. Removal to warm ward was followed by improvement. Here, perhaps, the cold air sucked into the chest through the wound may have had an influence.

Another case with influenza bronchopneumonia was moved back and forth twice from cold ward to warm ward with no apparent change.

From the cases that have been treated in the cold ward and in the adjacent warm ward the following conclusions may, I think, be drawn:—

(1) In the acute congestive stages of inflammations of the upper respiratory tract (rhinitis, laryngitis, bronchitis, especially of the small tubes, with or without bronchopneumonia) warm, moist air is of greater help than cold, dry air.

(2) In lobar-pneumonia, with high temperature and little or no bronchitis, cold, dry air is of great advantage. The same is true of pulmonary tuberculosis and of empyema.

(3) After the acute stage has passed, and when there is no inflammatory spasm of the larynx or bronchi, the cold-air treatment is of advantage in cases of rhinitis, laryngitis, bronchitis and bronchopneumonia.

DR. NORTHRUP.—When you talk about cold air it must be remembered that cold air is not necessarily fresh air. The air in the cellar is cold but not fresh. On the roof of a hospital the air is fresh. We built a shelter because of the storms from the west, and the first thing the nurses complained of was that the air was not good; they said they could not breathe well. It is because it is still air. The essential of fresh air is partly that it shall be circulating, moving air.

DR. GRAHAM.—Looking at the matter from the standpoint of private practice, I think one is quickly convinced that unless you get cold air in the sick room you do not get fresh air. In other words, in a private house if the room is warm fresh air is not being admitted. In hospitals we can regulate conditions exactly and have just as many windows open as necessary, but in private practice the room that is not cold is apt to contain vitiated air. It is necessary in private houses to have the room cool, at least 60° F. or below.

DR. HOWLAND.—It is, I think, the almost invariable experience of every one that children with acute infections do better in cold air than in warm air, and it is also, I think, true that chil-

dren with infections, especially pneumonia, do better out of doors in winter than in summer. It was shown years ago by the researches of Romberg and Pesler that the cause of death in acute infections was to be ascribed first to paralysis and later to collapse of the vasomotor system, and not of the heart. It was shown years ago also that with the use of vasomotor stimulants the blood pressure could be raised with amelioration of symptoms and cure in cases that otherwise would result fatally. There had been no attempt to do this with children until last year, when Huber and I tried using various vasomotor stimulants. We found that children with pneumonia put out doors and then brought in and given caffein and camphor, which ordinarily causes a rise, would cause a fall. We tried the same thing with children out doors and then brought in, without stimulant, and found in almost every case that the blood pressure promptly fell when the child was brought into a warm atmosphere. This, I believe, has been the case without exception. The experiment could be varied at will. It is true of healthy individuals in the majority of cases. It is true in all cases of pneumonia, and the results are more marked the sicker the individual. It is known that in the acute infections, as dysentery, typhoid and tuberculosis, there is a loss of blood pressure from the start, and the sicker the individual the greater the fall. Consequently, it seems to me a rise in blood pressure, which can be accomplished so easily as by putting the patient outdoors, can only result in benefit. The rise in blood pressure is permanent and constant and accomplished without disturbance to the individual at all. (The speaker showed results graphically portrayed by charts of some of these experiments; one child with blood pressure 95 mm. outdoors, brought in and blood pressure began to fall at once and continued until, at end of seventy-five minutes, it had fallen 15 mm., and continued low as long as the child remained indoors. A second child showed the same thing. A third child showed blood pressure of 130 outdoors and indoors a fall to 85. A fourth child showed blood pressure of 90 outdoors, with a fall of 10 mm. when brought in. The child was put out for six hours and had blood pressure of 102.5. A fifth child showed outdoors pressure of 100, brought in and there was a fall of 15.)

It is very interesting to see how this lowered blood pressure may be controlled. If you keep the child indoors and give caffein hypodermatically the blood pressure rises, but it will rise very little above a point which it would reach if the child were outdoors without the caffein. If you keep the child outdoors and give caffein the pressure will rise but little above that obtained by keeping the child indoors and giving caffein. The greatest and steadyest rise is accomplished just by the employment of cold air alone. It is very well known that stimulation of the skin and of the mucous membrane of the nose will cause prompt rise of blood pressure,

DR. BLACKADER.—I agree with the last speaker as to the value of increasing blood pressure in the latter stages of the disease; in the early stages it would seem that lowering the blood pressure would be indicated. The reason I would use caffen or camphor would be to stimulate the respiratory center. I am an advocate of fresh, free, flowing air, but it is because I feel that the child is getting more oxygen and a certain amount of stimulation of the respiratory center, rather than because of increased blood pressure. A few years ago it was the practice to lower blood pressure by the use of nitroglycerin in the acute stages of the disease, lowering the blood pressure by bleeding into the large abdominal vessels. I cannot think that it is quite the point to be emphasized, although extremely valuable and interesting to know that we can influence blood pressure in this way.

DR. SOUTHWORTH.—I should like to emphasize a little the advantage of cold, that is, the lowered temperature, not as bearing upon the treatment of acute respiratory diseases so much as in their prevention. It so happens that during the past two winters we have been carrying out the fresh air plan in the wards, and we have done it by discontinuing the use of one of the large steam boilers, so that we now have but one, and it is impossible to get the temperature up to the heights it used to reach. The temperature of the wards now is often so low that the faces and hands of the children look rather blue and chapped, yet acute respiratory infections have become so rare among the inmates of the hospital that we practically only have the infectious colds, which can now be distinguished from the other types, as when they appear in any of the wards they go from patient to patient.

DR. HOWLAND.—I believe it has been well shown by Romberg and Pesler that the cause of death in acute infections that they studied, pneumonia, diphtheria, etc., and by the work of Ravinski also, is paralysis of the vasomotor centers and that the heart is practically competent throughout. With proper resistance offered to the heart's action, with use of barium chloride, or constriction of the aorta, the heart would go ahead and beat for hours. The best explanation of the gradual fall of blood pressure is the gradual effect upon the vasomotor centers. It is, to a certain extent, a hypothesis perhaps. Often respiration ceases before the heart, not from disease *per se* of the respiratory center, but because the blood pressure is so low that the vasomotor center is not supplied with enough blood. The heart goes ahead and beats long after cessation of respiration, trying to fill up the empty arterioles. I think it is generally believed now that the old observation that the heart was beating too hard at the beginning of the disease, and that administration of aconite was indicated, was due to poor observation. That the vessels are empty is due to the effect of the poison on the vasomotor center, and the heart has to overwork to compensate for this.

DR. ABT.—Would you think of treating a patient with shock and collapse with cold? What kind of blood pressure apparatus did you use?

DR. HOWLAND.—I should certainly hesitate to apply cold to a patient in a condition of shock. The most striking result I ever saw obtained therapeutically in pneumonia was in a child that had lain for an hour or more pulseless absolutely. She was the color of death and the respiratory center had been so affected that she would breathe three or four times and then stop for four or five seconds. Her heart was beating violently. I did not hesitate to apply ice cloths to the abdomen and gave caffein and adrenalin hypodermically in enormous doses and she gradually came back so that her pulse could be felt and the respiration became regular, and in two hours she was conscious and she went on to recovery. Her temperature was 106.5°F. The patient was eight years of age. In surgical shock, I do not know.

We used the Fort apparatus, with a special cuff made much narrower than usual.

DR. GRIFFITH.—I would emphasize again that the sun parlor of the university has its windows open, and that the children are usually there instead of in the wards. That expresses my practice. What I have heard this afternoon, however, confirms me in my opinion that we are yet too far at sea regarding our knowledge of the actual relationship of physiology and of experimental therapeutics to symptomatology to permit us to confine ourselves to any one line of treatment. We are making a mistake if we abandon things we did ten years ago merely because they are old; we should be convinced that they are wrong. If there were time I should like to remind this Society of the various earnest discussions we have had in the past over the advantages, or the reverse, of various practices in which we were deeply interested at the time—the sterilization of milk, the pasteurization of milk, the value of cereal decoctions, the relationship of food to scurvy, and the like. There has always been a certain swinging of the pendulum and a final settling down to a certain quiet, defined position. So, too, as regards the value of cold air in the treatment of respiratory diseases. I am a firm believer in the method. Yet, are you satisfied that the employment of vapor in the room, the careful guarding against exposure, and similar practices in which we all believed a few years ago, had no value in any instance and did no good? I am not, although I admit I have drifted away from these methods on the wave of popular enthusiasm for the newer treatment. There is, I think, a little danger that we may make cold air treatment a fad, valuable as it undoubtedly is.

A PRESENT-DAY VIEW OF INFANT FEEDING.*

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The paper presented for your consideration and discussion will deal only with the artificial feeding of infants. No time will be used in an expression of opinion as to why artificial feeding is a growing necessity. Neither will time be taken in differentiating between the merits or demerits of the many makes of infant foods, nor in comparing the various animal milks which have been suggested and investigated as possible substitutes for breast milk. Nor will any space be given to the question of bacterial invasion of milk; the possibility of the transmission of tuberculosis; nor in a comparison of sterilization and so-called pasteurization.

The paper is intended to be practical, and the necessity for artificial feeding is accepted as an ever-present fact, and cow's milk is recognized as the most available substitute. Its argument will be—the food we are compelled to give, and the baby to whom we have to give it.

The difference in percentages of the gross constituents of cow's milk and human milk is widely known; and, as well, their valuation in calories; but that which has been demonstrated in relation to the ultimate chemical elements is not so widely known. In lecture, essay and treatise, much time and space are given to the discussion of the varying percentages obtained in a variety of combinations, in which milk and diluent, milk, cream and diluent, or even cream and diluent figure. Along with this runs the discussion of the comparative value of whey, water and barley water as diluents, the comparison of the percentages of human, cow, goat, ass and mare milk, and a showing-up of the various brands of manufactured baby foods. So much emphasis has been placed on *these* questions relating to infant feeding, that the division of the proteid element of milk into casein and lactalbumin, and the striking preponderance of casein over albumin in cow's milk, as against the preponderance of albumin over casein in human milk, making of the one an acid curding, of the other a non-acid curding milk, although known, occupies the back-

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ground in the mind of the average physician. The same lack of attention is given to the differing percentages of assimilable and non-assimilable fats in human and cow's milk, and to the diversity, in this respect, of the milk of various breeds of cow.

With the knowledge gained, the whole profession ought to be so taught as to appreciate the fact that, when milk is modified to the proper percentages, the result is far from the ultimate chemical composition of human milk, with a consequently wide distinction between the modification and breast milk as foods for an infant. But so insistent has been the iteration of percentages, and so predominantly does this one feature of artificial feeding sway, that to-day a large number of physicians are feeding infants in a haphazard way. Before their eyes, in the characteristics of the curd of human milk and in that of the modification, one soft and friable, not really a curd, the other hard and tough, is the evidence of this diversity in chemical composition; but so obsessed are they with the percentage thought that no impression is made by it. They do not seem cognizant of this biologic fact: the milk which has in it the chemical elements necessary to bring the infant from infancy to adult age in months, is not, and cannot be made, a perfect food for the infant which requires years to reach adult life. Nor do they seem to apprehend the corollary physiologic fact—the digestive and assimilative organs of the slowly maturing infant are not keyed up to the ability necessary to readily and assuredly take care of the food which the rapidly maturing animal requires. True, instances have been recorded of infants hardy enough in digestive and assimilative functions to dispose of milk sucked from the udder of the cow; but I surmise no one present possesses the hardihood necessary to make him advise this plan of infant feeding. Such recorded instances add weight to the argument which will be made in the second part of this paper—the baby we have to feed.

The statement has also been made many times, in treating on the subject of infant feeding, that nature is elastic. True; were it not so, no modification could be made which would be well borne by an infant; but if a man becomes controlled by this fact he will find it leading him into many a pitfall, especially if with this control he is possessed by the conception—"the average baby."

In what has been said, the writer has not intended to decry the value of a knowledge of percentages. We ought, in fact, to be so conversant with them that those contained in differing

modifications would be as a, b, c to us. But, having this knowledge, we ought never to lose sight of the fact—no milk can be made perfectly adaptable to an infant. The milk provided by nature, suited to its functional power, is in the mother's breast only. With this fact in mind, no haphazard feeding will be done, no mother will be given a formula and the infant dismissed. Instead, a close watch will be kept on every infant intrusted to our care, which, unfortunately, is dependent on other than mother's milk for nourishment.

The term "average baby" ought to be ostracized in speaking of anything appertaining to the welfare of infants. Especially is this true in the matter of artificial feeding. If there is such an entity as an average baby, then, perforce, all thought, all delving into chemistry, biology and physiology in the effort to find an approximately suitable food is wasted time and energy. The solution would lie in averaging the milk of mothers and making a modification parallelling this and giving it to one and all babies. A great many physicians at the present time are feeding infants as though baby and milk were settled averages. They have given no thought to the question of infant feeding. They have not, in fact, noted the fact that an infant cannot be taken from the mother's breast and given the breast of another woman with impunity. Their books tell them the percentages of the gross constituents of human and cow's milk, how to reduce the proteid with diluent, how to raise the fat, after dilution, to the proper proportion, and the sugar likewise, to fit the average baby. They have in their note-books, culled from various sources, a number of formulæ. One, a simple dilution of whole milk with water. Another, a dilution with a considerable addition of cream; another, a dilution of top milk; another, a dilution of part top and part bottom milk; another, a dilution of cream; another, with the diluent a carbohydrate water; still another in which percentages are given the go-by and the resultant modification is of proper caloric value. Each of these will fit the average baby; the conception of what the baby needs as nourishment coinciding with the viewpoint of the maker of the formula. If one does not suit, another, and another, and still others, are given a trial.

Meanwhile, the infant is bearing the brunt of blind experiment, and eventually the overtaxed digestive system rebels; assimilative organs, tired from the effort to get enough nourishment from an imperfectly fitted and digested food, become less

able to meet the demand, and in a shorter or longer time the child is in a serious condition. Many children so fed die of inanition; and those which live carry into the succeeding years the marks of the struggle for life against the error of the unthinking physician, who feeds *a* baby as an engineer oils an engine, with no conception that it is *the* baby, a unit, with which he is dealing. He sees infants of all types, differing in height, weight and mentality, age for age; some walking at ten months, others not until fifteen or eighteen; some talking at one year, others not until two. He sees this diversity remaining constant through infancy, into childhood and into manhood and womanhood. At twenty-one, one child stands a little over five feet, the other is six feet tall. Weight shows the same diversity. Often the shorter child outweighs the taller at twenty-one. One is short and stout, overweight according to insurance tables. Another is tall and lean, under-weight by the same tables. Both are hardy and vigorous. The evident physical individuality, emphasized at twenty-one, was present when each drew the first breath of air and took the first draught of milk from the mother's breast, but was unnoted, and with a set formula, a set rule for intervals, a set amount to be fed as his armamentarium, he goes through his medical life, signing numerous death certificates of infants, or in giving anodynes for colic, calomel or castor-oil to sweep out curds, digestive remedies to assist digestion, so-called intestinal antiseptics and antiferments and astringents for diarrhea. Fortunately the children who complete the first year; more fortunate still they who enter the second year with digestive organs not permanently damaged.

Everyone will admit this physical individuality is present at birth. Anatomically, the larger the baby the larger the stomach. How illogical to try to force the smaller stomach to accept the amount fitted to the larger! How illogical to try to make the larger satisfied with the amount requisite to the smaller! Yet both of these attempts are made in a certain number of cases, if a set amount for feeding is made the rule. Such a rule is just as illogical as a set formula. Only by close observation and study of the individual infant can the amount it requires be determined. Any amount under or over this will prove hurtful, unless the infant happens to be one of the unusually hardy ones.

But there is a deeper meaning to the unit thought of an infant. In adult life we see perfectly healthy men and women,

large eaters, but spare in build. We see others, likewise full of health, small eaters, who are stout. What determines this distinction? Something we do not yet fully understand, having to do with metabolic change and assimilative functioning. Given the opportunity to trace back the life history of one of each of these types, and the leading will go back to infancy. Always has there been this dissimilarity in result from the amount of food taken. Here is evidence of physiologic individuality, as well as physical. How illogical to attempt to set a rule for amount or interval. Each child is a law unto itself in capacity, digestive power and assimilative process. As observation only can tell us the amount to be given, so observation only can tell us the interval. The only rule that can be made is not to feed under two hours, and this rule is not of the physician's making. The normal child wakes up and demands it during the first two months; later it exercises its individuality, and may wake up at three, three and a half or four hours with the demand. Personally, I deem it illogical to awaken a child to feed, and I base my logic on the law of supply and demand, the individuality of the infant, and on the fact that sleep is fully as essential to the growing infant as is food.

One instance in my experience will show the deplorable result following a failure to realize the individuality of an infant in feeding it. Called to see an infant six months of age in consultation, I found it emaciated and on the verge of inanition, unable to digest the smallest amount of either proteid or fat. The father was over six feet tall, and lean; the mother was five feet ten, and weighed 106 pounds. The father was fifty-six, the mother forty-seven, both in perfect health. There were 6 children besides the baby, the youngest eleven years old; all were built on paternal and maternal lines, all healthy. The infant was a child of old age, and the father was anxious to make it a fat baby. It weighed at birth 6 pounds and was 23 inches in length, lean but vigorous. It was taken from the breast and put on modified milk, with an abundance of fat. Had the physician in charge done any thinking he would have told the parents that St. Bernards cannot be raised from greyhounds; and the human infant is quite as much a unit as is either breed of dog.

Some years ago I wrote these words to mothers: "Note the different ages at which babies begin to stand, or creep, or walk, and the wide difference in the development of the standing, creep-

ing or walking act. Note the varying ages at which they begin to talk, and the varying degrees of capability with which they develop language. These physical and mental individualities are recognized by everyone, occurring as they do in children in the same family. Just as individual is the functional life of infants. When this is recognized, theorizing on the question of infant feeding will stop, and each child will be studied to find out the capacity of stomach and the strength or insufficiency of digestive and assimilative functions. Then will the effort of the physician be to know all that can be known about food for babies, and his aim be to fit the food to the functional activity of the individual child."

The occasion for writing these words was some sad experiences, resulting from mothers taking their babies from the breast and giving in its place a modification made after a formula taken from a book. At that time I further wrote: "No amount of study and observation will equip a physician to do anything but treat the baby which he can see, handle and examine." Time has not changed my view, but has intensified it, until today I believe that the artificially-fed child has as much to fear from falling into the hands of a physician who has never thought of its individuality, or from a mother who is willing to feed it a modification advised by one who has never seen it, as it has from bacterial contamination of milk.

There is no teacher more able to impress indelibly a lesson than a mistake, providing the mistake is realized, acknowledged, and a study made of the causes leading to it. This paper is a leaf from personal experience; the lesson learned and the conclusions reached are the result of a close and deep study as to what underlay the bad results so frequently occurring from artificial feeding, these bad results having been acknowledged as due to error in feeding method. Since the recognition, acknowledgment, study, and reached conclusions, ample evidence has been received that many physicians were, and are, doing the same unthinking feeding, making the same mistake, but not coming to a realization of it; or, if doing so, failing to make conscious acknowledgment, and therefore continuing in the old routine way, continually repeating error.

One of the objects of this Society is "to spread a knowledge of pediatrics among general practitioners." I know of no single item of pediatric knowledge so important as that of artificial feed-

ing. And if I am right in conclusions reached, in conception as to what are the essential points in this direction, the physical and functional individuality of the infant, the impossibility of finding a perfect chemical substitute for breast milk, and the necessity of making a modification to fit, as nearly as possible, the unit, *the* baby in charge, then I wish to impress you all so deeply that you will return to your homes as teachers; teaching mothers, in view of the difficulty in arriving at an even approximately fit substitute for breast milk, the duty which devolves upon them; teaching physicians that knowledge of percentages, caloric values and chemical composition is wasted, if applied in the form of routine formulæ. If you find any such, who are giving no observation nor study to the infant, its physical capacity, its functional ability, its type, its environment, tell them that while they are giving the milk of a cow, the baby to which it is given is not a calf, and that it is *the* baby to be nourished, not *a* baby to be fed.

BILIOUS ATTACKS IN CHILDREN.—Philip S. Potter (*Boston Medical and Surgical Journal*, July 14, 1910) calls attention to the danger that lurks in a vague term like this. In every "bilious attack" the possibility of appendicitis should be foremost. The classical symptoms of appendicitis are often very slight in children and in all cases having a history of bilious attack a careful examination of the child's abdomen should be made, if possible, at the time of the attack. Recurrent vomiting and recurrent pyrexia are conditions that may be overlooked; the former yields readily to large doses of soda bicarbonate, and the latter condition is remedied by the exclusion of sugars and starches and the administration of calomel and arsenic. Both of these conditions are most common in nervous children. Beginning meningitis, migraine and renal vomiting have been mistakenly diagnosed as bilious attacks. Even otitis media has been known to produce symptoms commonly observed in a bilious attack. The most common and least significant of the so-called bilious attacks are those due to gastric indigestion or intestinal toxemia. While the term bilious attack may mean the most innocent of digestive upsets, the diagnosis must be carefully sifted, a thorough physical and clinical examination made and other possibilities excluded,—*Medical Record*,

THE RELATION OF ORTHOPEDIC SURGERY TO PEDIATRICS.*

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The study of the various diseases which afflict children has been made the object of special study for the past twenty-five years. The two specialties which have to do with the study of these diseases are those of pediatrics and orthopedics.

The longer one devotes his attention to the study of any special branch of medicine the more he is convinced that no one branch can be practiced to the exclusion of everything else. The body is a complex mechanism, with the well-being of one organ, or set of organs, depending more or less on the proper working of the other organs. For instance, it would be useless to treat a child for bow-legs, due to an active rachitis, without first getting at the underlying systemic condition, namely, the improperly nourished osseous tissue.

Rachitis is a subject which interests us all, because we all come in contact with these cases. The symptoms are familiar, namely, the enlarged head, enlarged epiphyses, beaded ribs, poor teeth, curvature of the long bones, flat feet, enlarged abdomen, post or lateral curvature of the spine, inability to walk, or backwardness in walking.

In prescribing the treatment for rickets we first have to decide if the disease is still active, or has reached the quiescent stage. If the former, the diet should be attended to; but we do not attempt to correct the deformity by operation in the lower limbs until the progressive stage of the disease has past.

When the active treatment (so to speak) of correcting the deformity in the lower limbs has been decided upon, it is our practice to use braces up to three years of age; after this age we find the operation of osteoclasis or osteotomy gives a quicker and better result. The brace treatment will take from six to twelve months, while a child fully recovers from the operation in six or seven weeks.

Of the methods of operation there are two—that of osteoclasis and osteotomy. The former has the advantage of being bloodless and of not shortening the leg but of lengthening it slightly;

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but if the fracture has to be near a joint, osteotomy has to be performed, because there is not sufficient room for the osteoclast to work, and the exact point of fracture is more accurately determined by osteotomy.

For the medical treatment we use phosphorus and iron. The former is best used in the form of U. S. P. elixir, gtt x to xx in teaspoonful of water three times daily. The latter, iron carbonate saccharated (Squibbs), dose 2 to 3 grains, which is readily taken dry on the tongue by young children.

Perhaps the most intractable disease with which the orthopedist has to deal is the paralysis following anterior poliomyelitis. We usually see cases after the acute attack has subsided and the child has entered the chronic condition. The extent of the paralysis may vary from the simplest form, which may be merely a little weakness of certain muscles, to the more severe form, where there is paralysis of both upper and lower extremities, with involvement of some of the trunk muscles, especially those of the back. After the acute symptoms subsided, the course of the disease varies in different individuals and in different epidemics. As a rule, however, where the upper extremities are affected, recovery begins to take place after a few weeks' time. The arms usually recover more quickly and more completely than the legs, so that after a few months much improvement has taken place.

It is after this stage of early recovery that the orthopedist is most likely to be consulted. The most successful procedure at this stage is a combination treatment of massage, electricity and exercise. The exact treatment will have to be modified according to the condition of the patient at the time. If the child is almost completely paralyzed in the lower limbs, massage and the galvanic current will have to form the bulk of the treatment and the exercise the minor part, and such exercises as they are able to do will have to be performed in the recumbent position. On the other hand, if the patient can walk, the exercises will take a more prominent position in the course of treatment.

Operative Treatment.—There are two forms of paralysis seen in children which may need operative treatment. The most frequent is anterior poliomyelitis, the less frequent condition being cerebral or spastic paralysis. Of the former condition, when recovery has commenced to take place, one group of muscles will recover before its opposing group, causing a contraction in the tendons of the stronger muscles and resulting in deformity.

A familiar example of this condition is paralytic equinus, due to contracture of the tendo Achilles. To prevent this undesirable result the child should be carefully watched during recovery, and as soon as there is any tendency to tendon contracture a brace should be applied to protect the weaker muscles. If deformity due to tendon contracture does take place, tenotomy must be performed and the joint placed in plaster-of-Paris splint. In the more severe cases of paralysis of the foot, where most of the muscles have permanently lost their power, more extensive operative treatment is necessary. Where there is simply lack of power without much deformity, the operation of arthrodesis, *i.e.*, the removal of the articular cartilage from the opposing joint surfaces, resulting in ankylosis, gives a very satisfactory result.

In cases of flail foot with considerable deformity, Whitman's operation of removal of the astragalus, with denuding of the joint surfaces, as in the previous operation, is the best treatment and gives a very useful foot.

Spastic paralysis is caused by cerebral hemorrhage or embolism. This condition may be congenital, or take place at the time of birth during a difficult labor, or may be acquired after birth. It is not so much a paralysis as it is a motor weakness, a lack of proper control of the muscles, an incoördination and stiffness of the muscles.

If the case is congenital, the brain is usually so deficient that more or less idiocy is present and treatment will be of no avail.

In those cases where the disease is acquired and the cases are seen when very young, it is best to give a very guarded opinion and try to maintain the hopes of the parents with the idea that the child is backward and we must have patience to allow time for his natural development.

As the child grows up to four or five years old we can then decide as to what can be done by treatment. If the mental capacity is good, we are justified in recommending treatment in which the object will be to reëducate the muscles to work together in coördination.

Many of these children walk on their toes, owing to contraction of the tendo Achilles. Lengthening these tendons by tenotomy will often permanently correct this difficulty.

Tuberculous joint disease is the most frequent disease of childhood. It is by far the most frequent of any of the surgical diseases of children,

Location.—Tuberculous bone disease occurs usually only in the joints and epiphyses and seldom if ever in the shafts of the long bones. Disease found in the shafts of the long bones is usually osteomyelitis, due to pyogenic bacteria and not to the tubercle bacilli.

In tuberculous disease in a joint, muscular spasm is one of the earliest symptoms to appear and the last to disappear. When it is well marked it is one of the most reliable of all joint symptoms. It is this muscular spasm which causes deformities such as flexion at the hip and knee and extension at the ankle joint in cases which have been allowed to get beyond the primary stage without adequate treatment. Pain is also an early symptom and may occur in the affected joint or may be referred to some neighboring region. For instance, in tubercular disease of the hip joint the pain is usually referred to the knee or to a point on the thigh, midway between the hip and the knee. This transference of pain is also frequently noticed in tubercular osteitis of the spine, where the pain is frequently transmitted through the intercostal nerves to the chest or abdomen. In the latter location it is frequently mistaken for stomach-ache or indigestion. When a child complains of more or less persistent abdominal pain he should be stripped of his clothing and his spine carefully examined, remembering that muscular spasm causing spinal rigidity is a reliable symptom, present long before deformity.

In tuberculous disease of the hip joint, when the pain first appears, it is usually slight and not constant, but as the disease progresses the pain increases in severity, being very much increased on the slightest movement.

Swelling.—In a superficial joint, such as the elbow, wrist, knee or ankle, swelling is marked and of characteristic appearance. Owing to the tumefaction the structures about the joint feel soft and doughy to the touch.

Heat.—In the superficial joints local heat is a constant and reliable symptom, which can be readily detected by the touch. When feeling for this symptom it is often advisable to compare the suspected joint with the well one of the opposite side. Normal joints are cooler than the surrounding flesh.

Limp.—In tuberculous disease of the hip joint, the limp appears early. The limp in the early stages may first appear and after a few days disappear, and suddenly, without any apparent cause, reappear again for a short time. Such an intermittent limp

is almost pathognomonic of tuberculous disease of the hip joint.

In Pott's disease of a very young child, say below three or three and one-half years of age, there ought to be no attempt at brace treatment of any kind. The pelvis before this age is not developed sufficiently to give adequate support to any appliance, and therefore the child has to be treated by recumbency on a cuirass or gas-pipe frame, over which canvas is stretched. The same course of treatment is also suitable for cases in whom the disease is of a severe type. The indications for taking a child off his feet and insisting on recumbency for a number of weeks, or months, according to the severity of the disease, are in general as follows: If the child does not stand straight and walk freely in his jacket or brace without pain or discomfort, he should be taken off his feet. The presence of a rapidly developing abscess. Rapid increase of deformity.

In the ambulatory treatment of Pott's disease with a kyphosis, Canot's method is the most satisfactory. He uses the plaster-of-Paris jacket, which is applied in the usual way. If the disease is in the lower dorsal or lumbar region, a fenestra is cut out over the kyphosis and pressure is applied by means of padding with cotton or felt, and a large window is cut out of the front of the jacket, leaving just enough substance to retain its stability.

For the mid-dorsal disease the jacket is applied over the shoulders. If the disease is still higher in the spinal column a neck piece is added, called the "officer's collar," and for cervical disease the jacket takes in the chin and occipital region. By applying the jacket in this way much deformity is prevented, a slight kyphosis may entirely disappear, and the large deformities are very much reduced.

In osteomyelitis we have the acute and chronic forms. Acute osteomyelitis usually attacks the shafts of the long bones or the epiphysis. The onset is usually ushered in by severe chills and high fever, and the familiar train of symptoms which are well described in all the text-books. Suffice it here to say that as soon as the diagnosis is made, and pus detected, no time should be lost in opening up the bone. Sometimes a delay of a few hours or over night will be sufficient to cause the death of the patient from septic absorption.

Acute arthritis of infants, which is really an acute osteomyelitis, commences in the epiphysis, but rapidly spreads to the head of the femur, causing destruction of it, with copious quantity

of pus, followed by dislocation in a very short time, sometimes only two or three weeks after the advent of the first symptoms.

Chronic Osteomyelitis.—This form runs a protracted course if the disease is left to itself or wrongly treated. If, however, a correct diagnosis is made early, and proper surgical means adopted, recovery is usually quick and satisfactory.

Rotary lateral curvature, although comparatively frequent in young children, yet occurs sufficiently often to bear it in mind when differentiating spinal deformities. When this condition does occur it is either of a rachitic origin or due to an intrathoracic condition, such as pleurisy with adhesions.

In younger patients, in whom the curvature is due to rachitic conditions following imperfect artificial feeding, the first and most essential thing is to correct the diet and to attend to the general hygiene.

Infants or young children ought to be kept lying on the back on a padded board, so as to remove the superincumbent weight. After about six or eight months of this treatment the child may be allowed to crawl around the room and so gradually assume the upright position. In older children, the treatment we use is gymnastic exercises, with or without plaster-of-Paris jackets. In some cases the plain jacket is sufficient; in other cases the efficiency of a jacket may be considerably enhanced by adding pressure over the deformity and cutting a fenestra over the concave side, so as to force the breathing on the side least used for respiration.

Congenital dislocation of the hip occurs chiefly among foreigners, or in children where either the mother or father is a European. It is very seldom seen in children of American parentage or in those coming from the British Isles.

The best time to operate on these children is from the second to the fourth year. As for the method of operating, *i.e.*, whose method is the best and how long it takes to effect a cure, depends entirely on the case. Each case should be selected and the form of operation should be determined by the conditions found in that particular individual, and the time consumed in the treatment is from three months to twelve months, or more. Occasionally the most experienced operator will fail to completely reduce a dislocated hip. This is always due to anatomic conditions, which cannot be overcome by the bloodless method.

In cases where the acetabulum is fairly well formed and the cotyloid ligament present, we have had good success with the Hibb's operating table, and three months' treatment in plaster for each hip is often sufficient time to allow. On the other hand, when the acetabulum is very shallow and the cotyloid ligament absent, or nearly so, it is sometimes necessary to put the limb up in the Lorenz position, with the thigh at right angles to the pelvis, with extreme abduction and outward rotation. These cases, of course, take a much longer time in plaster, and are liable to need careful and prolonged after treatment in the way of massage and gymnastic exercises.

In congenital club feet, which in the great majority of cases is equinovarus, it is better to wait until the infant has at least completed the first year before correction is attempted. The reason for thus waiting is that no matter how well the feet are corrected they will not retain the new position until the muscles are strengthened by exercise to maintain the normal position, and the only way to exercise these little feet is by allowing the child to walk. While the child is waiting until he becomes of proper age at which to operate, it will assist materially if the mother or nurse performs a gentle manual correction and massage. As a rule, no cutting is required in operating on these feet, simply manipulation under ether, and a plaster-of-Paris cast applied while in the over-corrected position.

EXPERIMENTAL STUDIES CONCERNING THE VALUE OF THE THYMUS TO THE ANIMAL ORGANISM.—Hart and Nordmann (*Berlin. Klin. Woch.*, May 2, 1910, No. 18), after a series of experiments with dogs, come to the following conclusions in regard to the value of the thymus gland. They find that in the growing period of the organism it is a most important, if not an absolutely, indispensable organ. It has a definite relation to the assimilation of nourishment, and it acts in regulating the action of the arteries and the heart. It appears also to be useful in maintaining the resistance of the organism against bacterial invasion. It also bears a definite relation to the development of the generative glands. Partial extirpation does not seem to cause any definite loss of vitality. An over-production of the secretions of the thymus causes a definite intoxication, which, however, disappears rapidly when the overproduction ceases.—*Boston Medical and Surgical Journal.*

NEPHRITIS IN CHILDREN.*

BY ARTHUR W. BINGHAM, M.D.,

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The importance of this condition was brought to my attention recently by the occurrence of a case of acute nephritis in a young child recovering from an attack of influenza. This recalled a fatal case of nephritis following measles. These cases were of different types, one acute and the other chronic. Both are fairly typical cases and I wish to report them briefly.

CASE NO. I. J. C., male, aged three years. Previous history good, having had no illness except a mild attack of bronchitis one year before. Family history negative. On February 11, 1910, he was taken with symptoms of grip, having some influenza and mild tonsillitis. He was seen by me for four days and watched with special care in order to detect any signs of scarlet fever or diphtheria. His symptoms all improved and I considered him convalescing. On February 21st, ten days after he was taken sick, his mother reported the urine to be very scanty and dark, although the child seemed fairly well. On examination of the urine it was found to contain considerable albumin, large numbers of hyalin and granular casts and blood. The total quantity for twenty-four hours was between 3 and 4 ounces. The child showed a very slight swelling of the face and ankles. The tongue was coated and temperature was 100°F. He looked rather pale and complained only of feeling tired. He was kept in bed between blankets, with a hot-water bag at his feet. Calomel was given at night (2 grains in one dose), followed by citrate of magnesia in the morning. A warm tub bath was given daily and patient wrapped in blankets for one hour, when he generally took a nap. A high saline enema was also given daily for a few days, and an effort made to have about one-half pint retained. This was not very successful, and as the child's condition was improving it was discontinued. Potassium bitartrate, one teaspoonful to the pint, was given as a mild diuretic, flavored with orange or lemon. As much water was given as he would take, but it was found rather difficult to give much plain water. The diet at first consisted of milk diluted one-third with boiled water. This was

* Read before the First Annual Meeting of the New Jersey State Pediatric Society, Atlantic City, June 27, 1910.

gradually strengthened, and later light crackers were allowed, then cereal, bread, toast, broth, etc. He was kept in bed for three weeks, at which time the albumin had disappeared and only a few casts remained. He was then allowed to sit up in a chair and to go out in his carriage. The temperature was never high, about 100°F., and at no time had he any symptoms of uremic poisoning. After five weeks he was playing about as usual, and today is apparently perfectly well, although there are still a few granular casts to be found in the urine.

CASE NO. II. H. C., male, aged four years. Family history negative. Previous history good. Two years before had pneumonia and had been well ever since. This child had an ordinary attack of measles at the same time with three other children in the family. He made a good recovery. About two months later there was noticed a swelling under the eyes accompanied by a small abscess connected with one of the tear ducts. The urine was examined and found to contain a large amount of albumin and casts but no blood. Just how long this had continued we do not know. Treatment was very unsatisfactory, as when the patient improved he was allowed to go about and to eat too much. He was very rebellious and it was impossible to give him an enema, warm bath or hot pack without his getting worked up to such a degree nervously that it was deemed inadvisable to continue. He had a large amount of edema of the face, hands and lower extremities most of the time. The skin was extremely pale. After a number of relapses the patient died of uremic poisoning at the end of a year.

"Every infectious disease of childhood may be accompanied by nephritis." No one will deny the truth of this quotation, and yet how often do we look for nephritis in the ordinary diseases of childhood? We are accustomed to make frequent examinations of the urine in cases of scarlet fever; but do we watch the kidneys in measles, diphtheria, pertussis, varicella, mumps, grip, tonsillitis, etc? This, I believe, is because we have been taught that nephritis is a fairly common complication in scarlet fever and very rare in the other infectious diseases. One of our authorities states that he has never seen a serious case of nephritis complicating measles. The impression that nephritis is uncommon in the ordinary diseases except scarlet fever leads us to neglect to look for it.

Nevertheless, systematic examination of the urine will un-

doubtedly show many cases of temporary albuminuria and a few cases of true nephritis. Beardsley, of Philadelphia, has just reported 2 cases of nephritis complicating varicella. The fact that these cases are few in number should not keep us from searching for them, for often it is only in this way that we are able to detect a mild nephritis. Our patients should be taught the importance of this, for it is hard for them to see why the urine should be examined when the child is apparently well.

The pathology of nephritis is fully described in the text-books, and will be omitted here. The symptoms of the disease vary considerably. The 2 cases reported had very few symptoms in common. Mild cases give no symptoms, and if the urine is not examined they are not noticed. A certain number of these mild cases, instead of recovering develop into chronic cases, and when detected are too far advanced for satisfactory treatment. Any child with marked pallor of the skin accompanied by slight fever should have the urine examined, but it is wiser to examine the urine before these symptoms are apparent. Severe cases are as a rule easily diagnosed. The urine may be scanty and highly colored, smoky or bloody. This in a child will be quickly perceived and brought to our notice. If there is much uremic poisoning there will be extreme nervousness or convulsions, a high tension pulse, vomiting and marked edema. A slight albuminuria will often be found early in the course of scarlet fever and other febrile diseases. This does not necessarily indicate a true nephritis and may disappear in a few days. True nephritis comes on, as a rule, later in the course of the disease, except in those cases of malignant scarlet fever causing death within a few days.

In the treatment of nephritis we must be guided partly by the form of the disease and the age of the child. The ideal method of treatment cannot often be carried out. Mild cases must be carefully treated, although some of them would get well without any treatment. By the proper care of the mild cases the number of chronic cases will be lessened. The severe cases will tax our powers to the utmost. The main object of the treatment is to rest the diseased kidneys and give nature a chance to restore them to their proper function. We must also keep up the strength of our patient. The child should be kept in bed on a light diet, consisting either of milk alone or milk and a moderate quantity of some farinaceous food. The bowels are kept active and the skin encouraged to assist in the work of the kidneys. Warm baths and

hot packs are valuable aids, also saline injections in the rectum. The skin must be kept warm. Only mild diuretics should be used in order not to irritate the already inflamed kidneys. Potassium bitartrate in the form of lemonade or orangeade is a valuable means of increasing the quantity of urine when necessary, for besides acting as a mild diuretic it is one method of getting the child to drink the desired amount of water. It is well to change the flavor of this drink, or the child may soon tire of it. When the pulse is of very high tension only a moderate quantity of water should be taken. The return to a general diet must be slow and it is difficult to regulate this satisfactorily in all cases, as these children are constantly calling for a greater variety of food.

In conclusion let me state that I am aware of having presented this subject very imperfectly, but my object has been to emphasize the importance of more regular examination of the urine in children, especially following the acute infectious diseases. By doing so we will be able to detect the disease in its incipiency and save a certain percentage of cases from chronic nephritis and death.

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RUPTURE OF NECK VESSELS INTO PHARYNX IN SCARLET FEVER.—J. H. Griffiths and D. F. Riddle (*Glasgow Medical Journal*, 1910, p. 23) record 2 cases of this rare complication. (1) Boy, aged nine and one-half years, developed cervical adenitis on the twenty-third day of a mild attack of scarlet fever. Three days later the right tonsil became swollen, and on the twenty-eighth day presented the appearance of a quinsy. Pressure with the finger-tip caused the swelling to break down, and this was followed by profuse and uncontrollable hemorrhage. Death took place in about a minute. The autopsy showed an irregular cavity behind the right tonsil lined with laminated blood-clot. The outer wall of the cavity was connected with the internal jugular vein. (2) Boy, aged three and one-half years. Death from arterial hemorrhage occurred without warning on the twenty-second day of disease in convalescence from scarlatina anginosa. The autopsy showed two large breaking-down glands in the neck and involvement of the internal carotid in the ulceration.—*British Journal of Children's Diseases.*

MECHANICAL INJURIES (FALLS, BLOWS) OF THE HEAD IN INFANTS AND CHILDREN. THE NECESSITY FOR IMMEDIATE TREATMENT. WHAT THIS SHOULD BE.*

BY H. ILLOWAY, M.D.,

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I.

This is a chapter in pediatrics that is undoubtedly of the greatest importance, and still, strange to say, nothing can be found thereon in the latest treatises on the diseases of children. Children of all ages fall on their heads or bump them in many ways, or are struck upon the head by others in the course of play or of quarrel; they cry for a while, are soothed to quietness, and very soon all is forgotten until sooner or later some one or other of the symptoms of *commotio cerebri*—cerebral concussion—manifests itself.

Though it is true that in a great number of the instances the traumatism has been of a trivial character, so slight that the brain was not at all affected thereby, it is equally true that in quite a number of the cases it is the cause of serious and not infrequently of fatal disease.

In a paper by Holt† on "Cerebral Abscess in Infants and Children," containing reports of 32 cases, we find in 10 of these cases, Nos. III., VI., VIII., IX., XII., XIII., XVI., XIX., XXVI., and XXXII., a history of traumatism—in some mild, in others more severe.

Gordon‡ (Philadelphia) reports a case of subdural abscess with a history of an antecedent traumatism, a fall on the head.

In the article on "Abscess of the Brain" in "Allbutt's System of Medicine," Vol. VII., it is stated that three different causes may give rise to this malady, and of these traumatism is counted as the second in importance.

It has been said by eminent pediatricists that only traumatisms of such great violence as to cause fracture of the skull are fol-

* Read before the Section on Pediatrics, New York Academy of Medicine, October 13, 1910.

† ARCHIVES OF PEDIATRICS, 1898. "Abscess of the Brain in Infants, etc."

‡ Archives of Diagnosis, April, 1909. "A Subdural Abscess, etc."

lowed by cerebral disease, but my own experience, and that of others as seen from reported cases, contradicts this.

In fact, no one can foretell whether a fall, a blow upon the head, will engender cerebral disease or not, and, in view of the fact that in a certain proportion of these cases such injuries are followed by grave disease of the brain, it is our duty when confronted by such accident or incident to prevent, if possible, the graver consequence.

This was brought home to me very forcibly by a case I saw with a colleague in 1880, that of a girl of ten, a bright, well-developed child, the pride of her parents. During the Christmas holidays she had been out with a number of her school companions, boys and girls of her age, coasting. One day, in going down a steep hill, she collided with something and struck her head so violently that she at once lost consciousness; she was brought home and a physician called to see her. When he came he found the patient restored to consciousness. He advised keeping her in bed for a few days, directed cold compresses to the head, and prescribed some bromid. She remained in bed for four days, and then, feeling perfectly well, got up, and in about ten days after the accident began to go to school again. Three weeks later she began to complain of headaches. The physician who had seen her after the traumatism was again called in to attend her. He again prescribed bromides, with occasionally a dose of chloral hydrate at night to procure sleep. Later on she was put to bed, and when I was called in to see her, in consultation with the regular attendant, she had been in bed three weeks. The main complaint was of violent headache. There was some rise of temperature, at no time high, not more than 101°F.; the tache cérébrale could be readily elicited; otherwise there was nothing special. After several visits my diagnosis was cerebral abscess. Other physicians, men of prominence, were brought in, and by all of them the diagnosis of cerebral abscess was confirmed. Nothing that we could do brought more than temporary relief, and in the eleventh week from the time she began to complain of headache she died. A postmortem examination was not allowed.

It was during my attendance upon this patient that the question arose within me whether anything could have been done at the outset to prevent this disastrous result. I recalled all I had learned as to cerebral injuries, and after careful consideration of all this I determined upon a line of conduct in the management of

these cases if I should happen to meet with more of them, namely, rest in bed and the administration of calomel in small doses. A year later I had occasion to put into practice the line of treatment just described.

One day, about noon, I was summoned to come immediately to Mt. Auburn (a certain part of the city of Cincinnati), as the younger son of a family of my clientele had been gravely injured. I was not at home at the time, and consequently did not get the message till much later, and it was nearly 2 P.M. when I arrived at the house. There I found another physician present, a much older gentleman, who at one time had held a chair in a prominent European university. I asked to see the patient and was told that he would be in in a moment; he had just gone out into the garden.

The history of the case was this: E. R., a stout lad of eleven, was playing leap-frog with some of the boys of his class during the morning recess. In the last leap that he made he jumped so far forward that he struck his head against the heavy limestone wall that inclosed the school yard. He fell to the ground unconscious. He was carried into the schoolhouse and laid upon a bench. He soon revived and shortly before the noon hour, after he seemed to have fully recovered, he was sent home under the escort of two larger boys. The mother, seeing him coming home thus escorted, became very much alarmed, but he quickly reassured her by telling her that he had only bumped his head against the wall while playing and that he was all right now. About 12:30 P.M. he asked for his dinner, as he was very hungry; however, his mother would not give him more than a large glass of milk and several slices of bread, all of which he ate with great gusto. His father came in shortly after, and, having heard what had occurred, telephoned for the physicians. The boy remained at home, but was up and about, and shortly before my arrival had gone into the garden to look after his flowers.

He came in from the garden, and, seeing me there, came to me, shook hands, and with a smile said that he was perfectly well and did not need any doctor. The other physician having already examined him, I proceeded to look him over, and, with the exception of a little soreness to pressure on the top of his head, could discover nothing abnormal. We now retired to another room to talk over the case, the father coming with us, being invited to do so. The professor said that, as the boy had evidently

recovered from the shock and there was no evidence of any other injury, nothing further need be done. The father asked me whether I agreed with the professor. I did not; though the boy was apparently fully recovered, I felt certain that if nothing more were done, sooner or later the symptoms of cerebral injury would set in. I proposed to forestall any serious consequences by resorting to immediate treatment to restore the brain to the normal state. I advised that the boy be put to bed and kept there for the next few days and that he be given 2 grains of calomel, rubbed up with sugar of milk, every three or four hours. The professor did not think it necessary for the boy to lie down, and said that if any medicine were to be given a dose of castor oil would be best. I explained that I did not want the calomel as a purgative, but wanted its antiphlogistic action. Finally, after he had suggested a number of other purgatives and I had refused assent, I yielded at the quietly given request of the father and agreed to the proposition to add some jalap to the calomel.

The prescription was written and sent to the drug store at the foot of the hill and left there with instructions to have the powders sent up to the house. About 5 P.M. the boy, who had not lain down, had a violent chill, began to vomit, and was soon in a high fever; shortly thereafter he became somewhat delirious. The mother at once called up the father on the telephone, he having returned to his office downtown, told him of the change in the condition of the boy, and also said that the medicine prescribed had not yet been brought to the house. He, mindful of what he had heard at the consultation, left at once for the nearest drug store, had a few calomel powders, 2 grains each, put up, and hastened home with them. The administration was begun at once and repeated by my directions, given by telephone, at intervals of two hours for the next two powders. The vomiting was at once arrested, and by midnight the fever had markedly abated and the patient had fallen into a sound sleep. I saw him the next morning; his temperature was normal; he was feeling well and wanted to get out of bed. The calomel was continued at intervals of four hours until the next day, when it began to act upon the bowels and was discontinued, and the patient was kept in bed and upon a light diet for an additional twenty-four hours.

He is now a practicing dentist of many years' standing, and during all this time has not had any reminder of the violent bump on the head.

In the course of the next three or four years I saw a few other cases of falls or blows upon the head which I treated in the manner described; but, as nothing special had occurred subsequent to the traumatism, and it cannot be maintained that anything would have occurred if they had not been treated, they are not further recorded here.

I then had occasion to test the value of the treatment in an adult. One hot night in July, about 11:30 P.M., I was called to a saloon to see a man who had been stabbed in the back with an ice pick and had been beaten over the head with a heavy beer mallet. When I reached the bedside I found the person in a heavy drunken sleep, from which he could not be aroused to more than grunt some incoherent and unintelligible words. As the stab was apparently only trivial and the head did not show any injury, I concluded that he could be left to himself till the next day. As I went to breakfast the next morning about 9 A.M., I saw the supposed patient in the street with his wagon, huckstering and yelling at the top of his voice. He came over to me and spoke to me, telling me that he was feeling well and would be in to see me in a few days. About 2 P.M. he came to the office explaining that his head hurt him very much and that he felt sick at the stomach. He had a temperature of 101°F. I directed him to go home and lie down in bed and prescribed calomel, 2 grains every three hours for three doses, then every four hours. I saw him again that night at 10 P.M. His head felt much easier and the nausea was relieved. His temperature was 100°F. The next morning there was no fever, no headache, or pain in the head. I ordered the powders continued at intervals of four hours for a day and a half longer, kept him at home for two more days, and then allowed him to go about his business. He had no further trouble.

In 1895, while I was connected with the East Side Dispensary of this city, a woman who had been a patient there for some time asked me to prescribe something for her son, a boy of ten years. He had a fever every day; it came on about 11 A.M., when he would lie down and remain in bed till the next morning; then he would get up and go about until the fever came on at the time named. She thought it might be malaria. How did she know he had fever? His face became flushed and his body, and particularly his head, felt hot to her. I inquired further into the history of his ailment and elicited this: The boy was well grown and strong for his age and usually went to school. Since the vacation

set in (this was about the end of July) he ran about much in the street. About a week before, while he was out in the street with other boys, some of the larger boys of the neighborhood picked him up and stuck him head downward into a barrel of ashes that stood there. When they let him go he ran home and cried much because his head hurt him; after some time he fell asleep and slept till supper time. He got up, said his head did not hurt so much, and ate a light supper—only bread and milk. He went to bed shortly thereafter and slept well all night. He complained a little the next day, less the following day, and not at all on the third day. He had continued to be up and about till three days before, when he came home about 11 A.M. and lay down, complaining that his head hurt him.

As it would be several days before I would be at the clinic again, I concluded to put the boy on the treatment detailed above, and told his mother that, if he did not improve, she could bring him with her to the clinic on my next day. I therefore directed her to keep the boy in bed continuously for the next four days and prescribed calomel—1 grain every three hours. When the bowels began to act, it was to be stopped for eight or ten hours, then resumed. A diet of only bread and milk and thin oatmeal was ordered. On her next visit to the clinic, the following week, the mother reported the boy well. His fever and headache had disappeared quickly under the medication prescribed. She had kept him in bed for four days, but then could no longer control him.

Some five months later the mother came again to the clinic for herself. I inquired as to the boy, and she told me that he was perfectly well; he had not been sick a moment since he had recovered from the headache and was attending school regularly.

Blows or falls upon the head are accounted among the causes of diverse forms of *meningitis*. They are said to be important factors in the causation of *epilepsy* in children.

II.

Mechanical injury of the head may lead to the development in the brain of a neoplasm. I have had occasion to see such a case.

Tumors of the brain and its coverings are not of rare occurrence in childhood. Though it be true that a very large percent-

age, 50 per cent. it has been said,* are of a tuberculous nature, and in quite a large proportion of these similar deposits are found contemporaneously elsewhere in the body, there still remains the very large percentage the etiology of which is as yet in total obscurity. It is not improbable, nay, it seems rather very probable, that in many of these cases, not excluding even those of tuberculous character, the first impulse to the development of the growth was a fall upon the head or a blow received upon it in the course of play, an incident quickly forgotten in the rapidly moving life of childhood. In fact, in the history of Case I., in the article on "Intracranial Tumors," by Starr,† a blow upon the head is mentioned as the beginning of the malady.

A blow upon the head or a fall thereon may be the exciting cause of a diabetes in the child.‡

III.

The treatment here suggested, prophylactic, as it were, in its nature, is based upon the solid foundations of pathology and therapeutics.

Pathology.—In all traumatisms of the head we have, if nothing more, a cerebral concussion. What that means in detail is as yet not clearly defined.§ This much, however, is certain, that under certain circumstances the brain cells may be injured and an inflammatory condition with a tendency to the development of pus or to abnormal cell-growth set in.

Furthermore, one of the effects, or, if you prefer, one of the symptoms, of cerebral concussion is vomiting, and this again by the congestion to the head that it determines, even though this be but momentary, has further a rather injurious influence on the damaged brain structure.

Therapeutics.—The treatment that is therefore imperatively indicated is to allay all irritation as quickly as possible and to further the restoration of the injured brain structures to the normal, and this is admirably achieved by the measures here indicated.

We are all agreed, I take it for granted, that keeping in bed the child that has suffered the traumatism is a most advisable and salutary measure.

* Read, "Cerebral Tumors in Children," *Pediatrics*, March, 1910.

† Keating, *Cyclopedia of Diseases of Children*, Vol. IV., p. 551.

‡ Leroux, "Study sur le Diabete Lucre chez les Enfants," Paris, 1881.

§ Arch. f. Kinderheilk. Bd. 30. "Ueber Hirnerschütterung und Hirndruck."

Calomel.—It is not necessary to go into any extended disquisition here upon this remedy which, so long tabooed by the scientific practitioners of the last half of the preceding century, has resumed in modern therapeutics the prominent place it held with the fathers in medicine of our country and is again treated of fully in the latest works on materia medica and therapeutics. But I wish to call your attention to two effects of this agent which are not clearly set forth in the books referred to:—

(1) It is a most potent remedy to allay vomiting. It is, I believe, this special action which led to its selection by the physicians of the past century as the remedy par excellence for cholera.

(2) It has a decided antiphlogistic action on the brain and its coverings, and, it has been contended, also on the spinal cord. It is, under the circumstances here treated of, the opium of the brain. By means of its antiphlogistic action you can effect what cannot be accomplished with the bromides and the various hypnotics.

It is true that the treatises on materia medica and therapeutics do not make any special mention of this marked action of calomel on the brain and its membranes, but you can find corroboration of what I have said in some of the older surgical writings, more particularly in Solly's "Surgical Experiences,"* wherein injuries to the head and spine are treated of *in extenso* with an abundance of clinical histories for illustration.

The following case, which is germane to this paper, demonstrates, to my mind, very strikingly the powerful antiphlogistic action of calomel upon the brain.

Baby H., *æt.* one year, a well-developed, bright male child. The parents lived on the third floor of a large tenement house. One fine day in the autumn (1889) his mother, holding him in her arms, stood with him out on a sort of porch that overlooked the rear yard. Suddenly, and in some way not understood by the mother, the baby slipped out of her arms and fell down on to the stone flagging in the yard, nearly thirty feet below. He was picked up by a woman who happened to be in the yard and carried up to the rooms of the family and put to bed. I saw him two hours later. He was lying there on the bed in a sort of stupor, with every few minutes a clonic convulsion of the left leg and the left arm. Strange to say, not the slightest contusion was to be seen about the head, but it seemed to me as if I could detect

* London, 1865.

through the skin a fracture of the skull. I directed that he be allowed to remain in bed, that he was not to be taken up, and that he be given the following:—

℞ Calomel gr. viii
 Sacch. lact. ℥ ii
 M. triturat. bene et divid. in pulv. aequal. No. X.
 Sig.: One powder every two hours.

I saw him early the next morning. He lay quietly in his cradle, had been quiet all night. The convulsive movements had become much less frequent and much less in extent. He had taken the powders and the mother had given him small quantities of milk pumped from her breast.

As I watched him for some time, I noticed that the lower extremity was not affected any more, and the arm only slightly, the forearm being the most affected, making movements which were lesser in extent and at much longer intervals than before.

I had the child sent to the hospital with a view to an operation. This was decided upon, and when the scalp had been laid open and the bone exposed it was found that the skull had been literally cracked in three places; three wide and long cracks extending from the vertex down nearly to the base. The scalp was at once replaced and the child returned to the ward. It died that evening.

The quick and effective manner in which the calomel allayed the cortical irritation, an irritation demonstrated by the convulsive movements of the upper and lower limb, is, I believe, proof positive of its remarkable sedative and antiphlogistic action on the brain and its envelopes.

One word more in closing. Though I have no experience in this direction, I am, nevertheless, inclined to believe that if we pursued the course here advocated with regard to injuries of the character above mentioned of the vertebral column, or through it, we should greatly lessen the number of children who become crippled in childhood, to their own great misfortune and to the misery of their parents.

CONGENITAL GOITER, WITH REPORT OF CASES.

BY EDWARD W. MOONEY,

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Adelman, in 1828, reported the first published case of congenital goiter; Mondin followed in 1839; D'Arbent, of Lyons, in 1849, reported the two first cases published in France; and in 1851 Malgaigne reported the third case in France and the first ever operated upon.

The reports of the Jenner Hospital in Berne, by Demme and Dorr, from 1862 until 1884, show 927 cases of goiter operated on in children, 56 of which occurred in the newborn (16.5 per cent.), 27 being in boys and 29 in girls.

Abt, of Chicago, observed 1 case in which the child died at birth. Fabre and Thevinot, in the *Review of Surgery*, Paris, 1908, report a total of 130 cases after a careful search of literature. Commandeur, writing in the Bulletin of the Obstetrical Society, Paris, 1908, reports 12 cases, all of which occurred in perfectly developed children.

Congenital goiter is most frequently found in countries in which goiter is endemic, but is not common. Sporadic cases occur rarely. It is not confined to the human species, as it has been found in cattle, horses and dogs. Because of the number of goiters which appear before two years of age, some authors consider that while a portion of these goiters may be acquired, still many must be congenital. Halsted and Edmunds claim to have produced congenital goiter. They found in the puppies of a bitch from which the thyroid had been removed, and which had been sired by a dog that had also been in part deprived of its thyroid, that the thyroid in the puppies was twenty times larger than in normal puppies.

Water has been blamed for the production of congenital goiter, because it contained too much sulphate of lime or salts of magnesia. Basingault explained the frequency of goiter in the mountains as due to the absence of oxygen from the water, the lessened pressure preventing the solubility of the gas. Chatin claims that iodine exists in the air and in the earth in all parts of the world—and that a minimal portion of this principle in the waters of certain countries may be the cause of goiter. The connection, if any,

between excessive saline constituents of water, deficient oxygen or iodine, and congenital goiter is very obscure.

Fabre and Thevinot state in this connection: "In the adult, it seems goiter results from the action of water charged with toxins, where again the intimate nature of the toxic agent escapes us. The mother drinks constantly of the water and develops goiter. Why should not the child be similarly affected?"

Heredity has been very generally accepted as a predisposing cause of congenital goiter. Some maintain that the mother will nearly always be found goiterous, the father sometimes; and some assert that it is always the maternal goiter which is transmissible, and not that of the father. Danyan found a goiter weighing 46 gms. ($1\frac{1}{2}$ lbs.) in a fetus of five months. In his report of 12 cases, Commandeur shows five goiterous mothers, in some of whom the goiter developed during infancy; in others during former pregnancies and lactation. In two instances the grandmother also had goiter. Of the seven non-goiterous mothers, two were primipara and two were multipara.

With some the theory of heredity finds scant favor. Speilberg objects for the reason that congenital goiter is not found often enough to be an hereditary condition.

Mekler, of Lusanne, thinks congenital goiter would be more common in goiterous districts if hereditary.

Professor Adami, of Montreal, in *Sajous Annual*, says: "In the absence of clear evidence that a goiterous mother, living in a non-goiterous district, may give birth to a child showing an already developed goiterous condition, I am doubtful if the condition can be truly said to be hereditary."

In-breeding, especially in goiterous districts, may be considered a predisposing cause.

Virchow maintained that congenital goiter was due to excessive nutrition of the thyroid body of the fetus, due to the marked development of its vascular system.

The later writers seem to lean toward the theory of infection in some form. For once, syphilis seems to have escaped blame; as a syphilitic history among the parents was rarely found, and the children did not exhibit signs of the disease. Speaking of infection Fabre and Thevinot say: "Some cases may occur as a result of banal infection of the mother, these pathogenic agents causing disturbances of evolution of the thyroid by their toxins."

In the proceedings of the Royal Society of Medicine, London,

1908, McCarrison reports a study of 203 cases of cretinism, which he found in the Gilgit and Mastuj districts, comprising an area of 500 miles of Himalayan country. Of the 203 cases, 88, or 44 per cent., had accompanying goiter, 2 of which were congenital, but in no case could the cretinic condition be attributed to the goiter. He considers endemic goiter as an infectious disease which partially or completely impairs the functional power of the thyroid. Concerning the effect of endemic goiter on the newborn he says: "Of all the infectious diseases which impair the unborn child's thyroid mechanism, the most important is endemic goiter."

He further claims that the result of the partial or total loss of the thyroid secretion of the mother is that the child is born either temporarily immune to goiter, with congenital goiter, or a cretin. All of which conditions he considers as stages in the same process and evidence of the minimal, medial or maximal action of the toxic agents on the unborn child's thyroid mechanism.

The vascular, or congestive type of congenital goiter has been blamed upon vicious intrauterine positions, such as face presentations; but very few cases of face presentation have goiter, and very few babies affected by congenital goiter are face presentations.

The condition is due, in all probability, to the persistence of the lacunar fetal circulation in the thyroid. Because of uterine compression during labor, the blood of the fetus accumulates in excessive quantities in these vessels, producing the congestive type of congenital goiter, which is also known as the vascular or telangiectatic goiter.

Morbid Anatomy.—The weight of the normal thyroid at birth is about 1 gm.; the size and weight of abnormal glands varies. Heckler reported one very large one weighing 416 gms. (135), removed from a child who died at birth from asphyxia. Demme reported one weighing 102 gms. (3½5). Either the entire gland may be involved, one or both lateral lobes, the isthmus alone, or in combination with either of the lateral lobes. Sometimes one lobe will be prolonged downward behind the sternum.

The classification of congenital goiter is similar to that of goiter in the adult. (1) Diffuse parenchymatous; (2) Telangiectatic or vascular; (3) Fibrous; (4) Adenomatous; (5) Cystic. The parenchymatous and vascular types are seen most frequently, the rest are rare. The parenchymatous goiter is characterized by

hypertrophy of the epithelial lining of the lobes without the formation of blood vessels. The telangiectatic, vascular or congestive goiter is characterized by an increase in number and size of the vessels, especially the veins, which are greatly distended and filled with blood. The distention may cause rupture of the blood vessels and hemorrhage into the interior of the thyroid body. There may be a distention of the neighboring vessels, producing a tumefaction of the soft parts and so masking the goiter.

Cases where the fibrous element alone is affected, forming the fibrous goiter, are very rare. Demme reported only 1 case of this kind, which occurred in a fetus of four or five months, weight 195 gms. ($6\frac{1}{8}\bar{5}$), size of a prune.

Adenoma are also rare. Mueller has reported 2 cases identical with those occurring in adults.

Cystic thyroids contain a colloid liquid, brownish in color and rich in cholesterin. The walls of the sack are formed from glandular or epithelial tissue and may become cartilaginous.

Symptoms.—Congestive or vascular goiter, if small, may cause no symptoms; larger ones press upon the trachea, causing dyspnea and cyanosis. The smaller ones may disappear in twenty-four hours, and later reappear upon exertion. Dyspnea was marked in 4 of Commandeur's 12 cases, and in 1 surgical measures were necessary to save the child.

Large goiters may interfere with delivery.

Diagnosis.—In all cases of dyspnea, occurring in the newborn, the thyroid region should be examined. The child's head should be thrown well back. The thyroid may be found high in the neck, and may extend behind the larynx; or one of the lobes may be enlarged and extend downward behind the sternum, simulating enlarged thymus. The thymus may be enlarged, and, if so, must be differentiated from goiter. The thymus normally lies behind the sternum from first to third rib. When enlarged this area is increased, and it may extend into the neck. It does not present the appearance of goiter, nor does it move on swallowing.

Prognosis.—The outlook for a child born with a goiter is variable, depending upon the variety or class of goiter, and upon the size. Small vascular or congestive goiters may disappear within twenty-four hours, may recur upon exertion by the child and then pass away, seemingly causing no particular damage. Possibly this may be the starting point of trouble which does not manifest itself until later in life, when, because of intense strain, violent emo-

tions, worry, or fright, goiterous conditions again become evident.

Of the parenchymatous class of cases, the small ones cause little trouble; but the large ones are very fatal. Richard had 39 cases, 23 of whom died, showing a mortality of 60 per cent. The operated cases, also, have a very high mortality.

Treatment.—A pregnant woman who is goiterous, of a goiterous family, or who lives in a goiterous district, should receive energetic treatment to prevent, if possible, the congenital development of goiter in the fetus.

Schmidt began at four months to give iodine to a pregnant woman who had already lost two children from congenital goiter. The mother's goiter decreased in size, and the child was born free from goiter.

Iodine potassium, iodine ergot, and various other drugs have been used. Thyroid extract should be given the preference and pushed to the limit. The small vascular goiters are best treated by hot baths, purgations and ice to the thyroid. In all severe cases, where dyspnea is marked, temporary relief can be obtained by position. Place the child upon one side and prop with pillows, so that the weight of the mass will be removed from the trachea.

Possibly the goiter may gradually decrease in size, if not, surgery offers the only hope.

Tracheotomy may relieve dyspnea, but it is not sufficient. Section of the isthmus, and fixation of same, which are inclined to sag, may relieve the dyspnea and diminish the size of the goiter; but removal of the gland is the only logical procedure.

I wish to report a series of 6 cases, all of which occurred in this vicinity.

CASE I. Occurred in the practice of Dr. Charles Douglas, of Detroit, in 1889. The family history was free from tuberculosis or syphilis. The mother was of French descent, multipara, goiterous. The father and other children were not goiterous. Dr. Douglas was called to attend the mother in labor, which proceeded normally until the head was delivered, when progress ceased because of some obstruction. On examination a large mass was felt between the chin and the breast. Delivery was completed by traction. The child was alive, cyanotic; and its respiration much embarrassed by the presence of an enormous congenital goiter, which filled the space from the chin to the chest, and which was level with the chin when the child was lying on its back.

The mother nursed the child. It thrived steadily and satis-

factorily like a normal child. The goiter gradually decreased in size and seemed to cause no trouble. No medical treatment was given. The child died at two years of age from an acute bowel affection.

CASE II. Was seen by Dr. Stanley G. Miner, of Detroit, in 1885, when he was called by the late Dr. Judson Bradley to see a female child two days old, which was suffering from dyspnea and cyanosis. On examination he found a bilateral enlargement of the thyroid, each side of which was the size of a pigeon's egg; pressing upon the trachea. The child improved and was living some months later, after which time she was not seen.

The mother was a multipara and goiterous; the grandmother also was goiterous.

CASE III. Reported by Dr. Cruckshank, Windsor, Ont. In 1895, Mrs. S——, multipara and goiterous, gave birth to a child which had a well-developed bilateral goiter about the size of a small egg. The child died on the second day. There was a history of specific disease in the family.

CASE IV. Reported by Dr. H. Wellington Yates, of Detroit, Mich. In February, 1901, there was born to Mrs. G——, a primipara, a baby girl, weighing eight pounds. The child was healthy and well formed, excepting an enlargement of the thyroid gland.

The mother had had a slight enlargement of the thyroid for some years, but had never been inconvenienced by it until she became pregnant, when it enlarged sufficiently to cause some respiratory and circulatory discomfort. She knew of no history of thyroidism in her family. After labor, which was normal, thyroid extract was given her daily in 5-grain doses. The baby was breast-fed. The enlargement in the mother's neck rapidly subsided, and at the same time the child's enlargement disappeared. The goiter in the child was the size of an English walnut; in the mother about the size of a small apple. No treatment was given the child. The thyroid treatment was continued for six weeks; by that time the growth had been reduced to the size it had been before pregnancy, merely appreciable.

I am not sure this change in the mother's growth would not have occurred with the usual involution incident to the puerperium, not accompanied by thyroid feeding.

The positive enlargement of the gland in the infant at birth and its disappearance upon administration of thyroid extract to the mother formed an interesting coincidence.

The child was living and well months later, when seen by Dr. Yates. They have migrated, however, and further history is not obtainable.

The following cases came under my observation:

CASE V. Miss H—, aged eighteen, Canadian, applied for treatment August 30, 1909, because of a bilateral enlargement of the thyroid. At times she experienced slight choking sensations, which were uncomfortable but not serious. During menstruating the discomfort was greater and the goiter increased in size. Her general health was good. No specific or tubercular history in the family. Her father and two brothers are non-goiterous. Her mother has a large goiter which developed about puberty, and two maternal aunts are goiterous.

The mother stated that the daughter was born goiterous, and that she spoke to the attending physician about it at the time. The physician has since died, so I cannot submit his statement.

CASE VI. On July 2, 1909, I was called to see Mrs. B—, who expected to be confined in about three weeks. She was forty-one years of age, of French descent, multipara and goiterous, large and heavy; her appearance strongly suggesting myxedema. Urinalysis showed 2 per cent. sugar. On July 26, 1909, I delivered with forceps a large, well-formed, female child, which weighed about twelve pounds. The child was dead when delivered, but evidently its death had been of recent occurrence. On examination, a well-developed bilateral goiter was found. It was removed and is here exhibited. Weight 32 gms. (1 oz.). The thymus gland was normal. The pathologic report of Dr. Sill, of the Detroit Chemical Laboratory, is as follows:—

"The tumor is well encapsulated and surrounds the larynx and trachea. It is composed of two lateral lobes and an isthmus. It is evidently a thyroid gland. On section it is found to be composed of a plexus of capillaries, the walls of which consist only of a layer of endothelial cells. Between these vessels are masses of cells which vary considerably in shape and somewhat in size. Some are spindle, some round and some polygonal.

"The normal gland structure is entirely lost, and is replaced by these capillaries and cells, which are arranged in lobules separated by bands of dense connective tissue.

"It is a malignant tumor of mesoblastic origin and may be classified as a perithelioma or angio-sarcoma."

The following points are of interest in the 6 cases:—

- (1) All six mothers were goiterous.
- (2) Five mothers were multipara.
- (3) One mother was a primipara.
- (4) One mother had sugar in urine before labor.
- (5) In one case the mother and grandmother were goiterous.
- (6) In one case the mother and two of her sisters were goiterous.



GOITER FOUND ON AUTOPSY IN CASE VI.

(6½) In one case there was a history of infection in the family.

- (7) One baby was born dead.
- (8) One baby died two days after birth.
- (9) One died two years after birth of bowel infection.
- (10) Two were living when last heard from.
- (11) One living, eighteen years old, goiterous.

402 Fine Arts Building.

EDITORIAL NOTES.

DR. LA FÉTRA'S RESIGNATION.

It is with particular regret that we have to announce the withdrawal from the editorial board of the ARCHIVES of our senior editor, Dr. Linnæus Edford La Fétra, the press of whose other activities compels his resignation. Dr. La Fétra succeeded Dr. Walter Lester Carr in the editorship in 1905, and in spite of much time spent in teaching and in the conduct of a very active practice has found opportunity to devote to the ARCHIVES much of the very best of his mind and counsel. Appreciating thoroughly his desire to lay aside part of the many calls upon his time, we are yet very sorry that it has had to be the ARCHIVES which has been chosen, and in bidding him a very grateful farewell from active participation in the journal, we wish to voice our appreciation of his efforts in keeping the standard of the ARCHIVES so high, and to express our earnest hope that we may always have the privilege of calling upon him for his experienced suggestion and advice.

CORRECTION OF DR. GRUENING'S ARTICLE.

In the article by Dr. Emil Gruening in the October number of the ARCHIVES, an error appeared which reversed the meaning which he intended. The sentence, which occurs on page 734, should read: "In the great majority of these cases the existence of the purulent disease of the middle ear was *not* suspected by the clinician."

SOCIETY REPORTS.

THE PHILADELPHIA PEDIATRIC SOCIETY.

Joint Meeting with the Section on Pediatrics of the New York Academy of Medicine, November 8, 1910.

CHARLES A. FIFE, M.D., PRESIDENT.

NASAL DIPHTHERIA.

DR. EDWIN E. GRAHAM read a paper on the symptoms, management and treatment of nasal diphtheria. (See p. 887 for article in full.)

DR. ROWLAND G. FREEMAN said that, although anaphylaxis was a real danger, he thought this fact should modify our use of antitoxin only by inducing us to use a very large initial dose, and so, if possible, avoid this danger, which would exist in the administration of subsequent doses. Should, however, there be any indication for a subsequent dose, the danger of anaphylaxis is so small in comparison to the danger of diphtheria that this danger should not in any way modify our conduct. The occurrence of this phenomenon is certainly extraordinarily rare. The speaker could not recall a single case in his experience where such a reaction had occurred, although he mentioned 2 cases of infants who had received between 40,000 and 45,000 units in repeated doses with no bad reactions.

DR. M. NICOLL, JR., said that in spite of the very general use of antitoxin as a measure of prevention, statistics show that there is little or no decrease in the incidence of diphtheria, and he believed that a chief cause of this was the spread of the disease through the non-recognition of nasal cases, with few or no constitutional symptoms, and the lack of proper quarantine measures against actual cases, especially those that assume a chronic form. It is not generally known how very fatal acute nasal diphtheria often is in the case of young children, especially when it occurs as a complication of scarlet fever or measles. He referred to four children in adjoining beds recovering from scarlet fever who died as a result of nasal diphtheria. He regards the latter form of the disease, when occurring under the conditions mentioned, as only secondary in severity to the laryngeal type. Dr. Nicoll objects to syringing the nares, believing that irrigation is much more effect-

ive, and, if done under low pressure, less likely to force fluid into the eustachian tubes. The patients should be well confined by means of a sheet firmly pinned about them and at first a few drops only of the solution introduced, and then, after the patient has a breathing spell, the irrigation continued until the anterior and posterior nares are freed. By this method plugs of loosened membrane can readily be removed. Normal salt solution heated to the body temperature is preferable to the various antiseptics recommended. In his experience, anaphylaxis may be disregarded as influencing the treatment. Dr. Nicoll showed a specimen of a typical nasal plug removed by irrigation, together with a photograph of the method of performing irrigation, showing the way the child is wrapped up at the Willard Parker Hospital.

DR. B. VAN D. HEDGES said that we should remember that there are diphtheria carriers, much as there are typhoid carriers. He referred to a recent outbreak of diphtheria in Plainfield, N. J., in which an unsuspected case of postnasal diphtheria had probably acted as a carrier, causing the spread of the disease.

DR. T. S. SOUTHWORTH emphasized the value of enlarged cervical glands as a diagnostic symptom, especially in cases in which there is only slight nasal discharge. One of the commonest types of nasal diphtheria is that seen in marasmic infants, accompanied by some bloody or chocolate-colored nasal discharge. This condition is often overlooked, especially in a ward. In the treatment of this condition, Dr. Southworth uses a creamy suspension of stearate of zinc in albolene. Both discharge and bacilli disappear rapidly under its use in the nose.

DR. L. E. LA FÉTRA asked Dr. Graham what he does with those chronic cases of nasal diphtheria in hospitals, in whose cultures are found diphtheria bacilli which are non-virulent.

DR. GRAHAM answered that he considered it legitimate to allow those cases with non-virulent diphtheria bacilli to return home and to mingle with other children.

SOME ANATOMIC FEATURES OF THE CHILD'S THORAX AND THEIR PRACTICAL APPLICATION IN PHYSICAL DIAGNOSIS.

DR. GEORGE FETTEROLF and Dr. J. Claxton Gittings demonstrated sections and dissections made of bodies of infants which had been injected with 10 per cent. formalin solution and frozen.

They discussed the postural relations of the thymus, ribs, heart and lungs, and their various component parts.

DR. DAVID BOVAIRD, JR., said that the interest and instruction with which these demonstrations have been received show that the curricula of most of our medical schools lack a new and valuable course, one in applied anatomy. The application of anatomy to surgery is an old theme; that it could be made to throw so much light on unsettled points in medicine is to most of us rather a revelation. The studies of Drs. Fetterolf and Gittings hold so many facts of interest that it is quite impossible to do justice to all of them. Two applications of points made might be suggested. First, the demonstrated relation of the left innominate vein makes it clear that one of the earliest effects of enlargement of the thymus must be pressure upon that vein, with resulting cyanosis of the neck and face on that side. The fact that such cyanosis is notably absent in the clinical conditions associated with enlargement of the thymus, especially in the cases of thymus deaths, constitutes a strong argument against the theory that these conditions are caused by mechanical pressure of the enlarged gland upon the trachea and neighboring structures. Secondly, the relations shown to exist between the heart, the left lower lobe and the pulmonary veins serve to explain some of the puzzling conditions found in the course of acute pericarditis with effusion. We are all familiar with the fact that many cases of such pericarditis present certain physical signs over the base of the left lung posteriorly. These signs are usually accepted as due to pressure of the enlarged sac on the left lung near the root. But we often find that the signs of compression gradually change to those of fluid in the pleura and on aspiration we find that there is a serous effusion of considerable amount in the sac. This sequence of events is explained by the demonstration of the fact that the enlarged heart (or pericardial sac) will press not only on the lung but on the left pulmonary veins and thus the serous effusion results from the mechanical obstruction to the return circulation.

DR. G. R. PISEK spoke of the relations between the lobes of the lung and the chest wall and its importance in thoracic surgery, as well as physical diagnosis. He asked whether Dr. Fetterolf had found any changes in the relations of the heart and lungs as the infant grows to childhood, for instance, in children of three and five years of age.

DR. FETTEROLF answered that they had been unable to secure the bodies of older children for comparison, but that they hope to supplement the present work with future studies.

DR. LA FÉTRA said that Drs. Fetterolf and Gittings have shown most beautifully how the heart of an infant occupies most of the chest anteroposteriorly, and that this explains the dullness so commonly found upon deep percussion on the left side of the infant's back. They showed also very well the position of the right auricle in the fourth right interspace, thus confirming the statement of Lees that the enlarged right auricle can be made out by dullness in this situation and for one or two spaces higher on the right of the sternum.

DR. GITTINGS said that Dr. Bovaird had probably misinterpreted their meaning. From the anatomical standpoint they noted two facts in regard to the thymus: first, that it reaches back to the trachea at one level, and second, that the left innominate vein interposes between the trachea and thymus at a lower level. They advanced the theory that swelling of the left innominate vein, resulting in pressure on the trachea, might account for some of the cases of sudden death of children during anesthesia. Preceding these deaths the cyanosis is often observed. In regard to direct pressure by the thymus on the trachea, they stated that it would seem that "sudden death might be caused by even moderate swelling of the gland." Although tracheal pressure fails to explain the symptomatology of most of the cases of so-called "thymus death," yet this anatomical relation furnishes some ground upon which the advocates of the "pressure theory" can stand.

ALBUMIN IN THE URINE OF NORMAL CHILDREN.

DR. S. McC. HAMILL and DR. K. D. BLACKFAN discussed the frequency and significance of albumin in the urine of normal children, after a long series of urine examinations. Chemical examination for bodies other than albumin was made; the stools were also examined. After discussing their routine, which showed a remarkable percentage of albumin in the urine of normal children, they discussed the significance of their findings. Reference was made to both serum and the so-called nucleo-albumins.

DR. H. D. CHAPIN said that this paper confirms the opinions held by many observers. Some years ago Dr. Chapin concluded

that any bodily disturbance in infants was liable to be followed by the appearance of albumin in the urine. In a series of cases of gastrointestinal, pulmonary and other diseases, a large majority of the children showed albumin and casts in the urine. Of 86 cases of gastrointestinal disease, 75 had albumin and 37 both albumin and casts; 57 pulmonary cases had 49 showing albumin and 32 both albumin and casts; of 45 cases of general diseases, neither gastrointestinal nor pulmonary, 31 had albumin in the urine. All of these cases came in routine practice and were not selected. Dr. Chapin, since that time, has regarded these findings of no special significance.

DR. JOHN HOWLAND said that these studies of Dr. Hamill and Dr. Blackfan have both a practical and a theoretical interest. They show plainly the very great frequency of albumin in the urine of perfectly healthy children. We all of us have realized that albumin with or without a few casts in an otherwise normal child does not necessarily mean nephritis; but Dr. Howland doubts if any of us have recognized heretofore how very common a finding this is. It only goes to show that valuable information can be obtained from a sufficient number of careful examinations. Under ordinary circumstances we would not be apt to think much of an occasional trace of albumin, but after scarlet fever or diphtheria such a finding would occasion considerable concern. In such a position it would be comforting to know that albumin, especially that precipitated by 50 per cent. acetic acid, is regularly and almost normally present at some time. The theoretical interest attaches to the question whether these may not be instances of alimentary albuminuria. It is possible to produce in men and animals by the feeding of excessive quantities of albumin an alimentary albuminuria, just as it is possible to produce by sugar an alimentary glycosuria. Murlin was able to show that gelatinuria results after dogs are fed on large quantities of gelatin, and Fr. Müller is authority for the statement that white of egg appears in the urine after its excessive ingestion; but others have been unable to determine the character of the albumin that appears. Clinical methods fail. Gideon Wells attempted to show it by anaphylactic experiments, but could get no evidence of the presence of any albumin but serum albumin. With children it is possible that the question may be somewhat different. The intestines and kidney of the young are more permeable to foreign sub-

stances. This can be demonstrated for bacteria and the interesting observations of Wile seem to show that starch granules as such can be absorbed from the intestines, traverse three sets of capillaries and be excreted in the urine. Recently Stecker has attempted to prove the presence of foreign proteins in the urine of children with albuminuria by precipitin tests. He obtained a precipitate with the serum of an animal immune to beef protein in about 25 per cent. of his cases, but precipitin tests are somewhat unreliable and cannot be accepted as entirely conclusive. It would seem, however, that with the increased permeability of the child's intestines, there is a greater opportunity of foreign albumin being absorbed and excreted by the kidneys, and it would be interesting to see whether the albuminuria in such cases as Dr. Hamill has investigated could be entirely prevented by a temporary diet without meat, eggs or milk.

DR. FLOYD M. CRANDALL said that the paper was in line with his own clinical experience. He had come to regard occasional traces of albumin in the urine of children, as shown by modern delicate tests, as of little clinical significance. He was, however, surprised at the frequency of such findings in the careful observations reported by the readers of the paper.

DR. W. B. HOAG referred to a case of his, a boy born in the tropics, who had had malaria while there. He came to New York at the age of six years and was apparently well. After overexertion, followed by chilling, acute edema with albuminuria and casts developed. He recovered, but now has distinct traces of albumin, but no casts nor questionable epithelium. Though well and ten years old, Dr. Hoag discussed the probable future of this patient. Is he to be considered a "normal child"?

DR. E. H. BARTLEY considered the examination of the urine in children of great help in diagnosis. Traces of albumin are of slight significance, following exertion, exposure to sudden changes of temperature, etc. Nucleo-albumin is normally found in the urine. The slightest irritation of the renal mucous membrane will increase it, and, if persistent, will produce albuminuria. A positive test for nucleo-albumin only indicates a slight increase over the normal amount. There seems to be no constant relation between traces of albumin and the hyalin casts and cylindroids. Hyalin casts and cylindroids, therefore, have little diagnostic significance.

A CASE OF RABIES.

DR. ALFRED HAND, JR., DR. C. Y. WHITE and DR. JOHN REICHEL reported a case of rabies, with autopsy and complete pathologic findings. After reading a history of the case, they discussed the predisposing causes, incubation, virulence of seats of inoculation, proportion of human beings bitten by mad dogs and developing rabies, general symptoms, prognosis and treatment. The autopsy report gave a general negative pathology. The Negri bodies were demonstrated in the central nervous system.

DR. REICHEL added that he has tabulated the pathologic findings in 9 suspected cases of hydrophobia, from which he had examined the spinal cords. In 6 of these cases there was proof that the patients had died of rabies.

Vol. XXIV, 1901

TREATMENT OF WHOOPING-COUGH.—Berliner, writing in the *Münch. med. Woch.*, has introduced another method for the treatment of whooping-cough. He thinks that practically all of the long list of drugs usually employed are unsatisfactory, with the exception of quinin, used by him in a special manner. Finding that insufflation of quinin frequently produced paroxysms of coughing, he has for the past two years employed in all cases an ointment containing from 15 to 40 grains of quinin in from 2½ to 4 drams of lard, according to the age of the child. Three or four times a day a pellet of the ointment, about the size of a pea, is introduced into each nostril by means of a small glass rod. The child is placed on its back so that the ointment may penetrate to the deeper parts of the nasal cavity. In one case the improvement was immediate, but, as a rule, considerable benefit was secured at the end of three or four days. Not only do the paroxysms diminish in number, but they decrease in severity, the fit of coughing subsiding into an ordinary cough as it gets less frequent. Some relapses occur, but they yield to renewed treatment. The treatment is much more effective the younger the child. The general convulsions consequent on the paroxysms in children under two years of age cease, as a rule, as soon as this treatment is begun. The method has the additional advantage that it is easy of application.—*The Practitioner*.

CURRENT LITERATURE.

ABSTRACTS IN THIS NUMBER BY

DR. CHARLES E. FARR.
DR. S. FELDSTEIN.

DR. M. C. PEASE, JR.
DR. FRITZ B. TALBOT.

DR. S. W. THURBER.

DISEASES OF EAR, NOSE AND THROAT.

MYGIND, HOLGER: THE SUBPERIOSTEAL ABSCESS OF THE MASTOID REGION. (*Annals of Otology, Rhinology and Laryngology*, September, 1910, p. 529.)

The frequency of this lesion is evidenced by the fact that out of 2,500 cases of acute and chronic middle ear suppurations occurring in the Copenhagen Commune Hospital, 100 subperiosteal abscesses were found. Eighty-five per cent. of these cases occurred in children under fifteen years of age; the youngest patient being but two months old. In the great majority of cases the primary trouble was an acute middle ear suppuration; 78 per cent. In children these abscesses usually appeared during the first week of an acute otitis. The streptococcus was the prevailing germ. This complication attending middle ear infections frequently leads to cerebral lesions and sinus involvement. A subperiosteal abscess most frequently develops from a mastoid osteitis; secondly, it may spread by way of the aural canal and from there subcutaneously; thirdly, it may spread through the fissure mastoidea-squamosa, and, fourthly, through the emissary vein (Koerner).

Absence of pain is very common, and may deceive both the patient and physician; the temperature in more than 85 per cent. of the cases was under 101°F. A higher temperature may mean intracranial complications.

The author believes that simple resection of the mastoid process or radical resection of the middle ear should always be performed. A Wilde incision is not enough. S. W. THURBER.

HUDSON-MAKUEN, G.: THE RESPIRATORY AND VOCAL SYMPTOMS IN PAPILLOMATA OF THE LARYNX. (*Annals of Otology, Rhinology and Laryngology*, September, 1910, p. 684.)

Laryngeal growths interfere with respiration and vocalization in two ways, viz., by their obstruction and by their interference with the action of the intralaryngeal muscles. The author calls attention to the double valvular action of the vocal cords, which

appears both in inspiration and expiration, and is explained by the fact that the true cords are concave on their upper surface, and inspiration tends to keep them together, while the false vocal cords are concave on their under surface and expiration tends to fill the ventricles and keep the vocal bands together.

The respiratory function of the larynx may not be interfered with until the growths are of sufficient size to make an obstructive mass; still, on the other hand, the situation of even a small growth may be such as to impede breathing in certain positions of the body, and a child will often start out of a peaceful sleep by the increasing difficulty of getting air when in the prone position, when the growth has not been noticed during the upright position. These respiratory symptoms are usually of gradual onset. The act of coughing may throw the growth into new positions and produce obstructions otherwise not noticed.

However, the first symptom of laryngeal papilloma is the interference with vocalization and, in children, this may retard normal speech development. Hoarseness and absence of pain in a child should always lead to a laryngeal examination.

S. W. THURBER.

PATHOLOGY.

KRASNOGORSKI, N.: THE DISTURBANCES OF THE WATER METABOLISM. (*Jahrb. für Kinderhk.*, October 13, 1910, p. 373.)

There are three clinical types of these disturbances. The first type comprises those cases in which, in spite of the absence of pathologic phenomena and symptoms of gastrointestinal disturbances, there is no gain in weight or marked daily fluctuations in weight. These fluctuations become exaggerated with increase of carbohydrates or salts in the food. The condition is due to a disturbance in the fixative power of the tissues for water. The tissues bind large quantities of water, which they rapidly eliminate within a short time again.

The second type includes cases of latent edema in which large gains in weight occur during the course of five or six days as a result of ingestion of excessive amounts of carbohydrates and salts. A proportionate decrease in weight occurs equally rapidly on discontinuance of the unusual diet. In these cases the tissues have lost their resistance to the penetration of excessive quantities of water. Under abnormal diet rich in carbohydrates and

salts, the water which has permeated them is held in colloidal union for a short time.

In the third type are found the cases of clinical edema. The water which is retained is no longer in an assimilated state. The edema appears within twenty-four hours and spreads rapidly over the whole body. The body weight, however, increases but slightly. The kidneys remain unaffected.

At the instigation of Professor Czerny the author carried out metabolism experiments on four children, two of which reacted with clinical edema and two did not. The diet during the experiments was either whey or breast milk, to which sodium chloride had been added. As a result of these experiments it was found that edema can occur without salt retention, or even while increased elimination is taking place. The two children that reacted with edema retained less salts than the other two. The edema is probably due to the irritating effect of the salts on water metabolism, and occurs in those children where the tissue resistance has been lowered. The excretion of salts by the kidneys was found to be normal in all the cases.

S. FELDSTEIN.

SURGERY.

BOTTOMLEY, JOHN T.: CONGENITAL STRICTURES OF URETER. (*Annals of Surgery*, November, 1910.)

Bottomley reviews the cases reported in the literature, 55 in number, and adds 1 of his own. The stricture is usually in or near the bladder and varies from a simple narrowing to a complete impermeability. The ureter is dilated, thin-walled and tortuous, varying in size from that of a pencil to that of a small intestine, but is not usually thickened. The kidney may show enormous hydronephrosis or a very marked primary atrophy. The former is much more common, the cystic kidney sometimes filling the whole abdominal cavity. Infection will produce a pyonephrosis.

The symptoms are pain, frequency of urination and occasionally hematuria. A mass can frequently be made out in the loin and on cystoscopic examination a cystic protrusion may be seen on the affected side. The diagnosis is rarely made before operation, but the condition should be suspected when urinary symptoms are present or there is a swelling in the loin. The treatment is nephrectomy or, if possible, anastomosis between the affected ureter and the bladder.

CHARLES E. FARR.

MEDICINE.

PLACE, EDWIN H.: CUTANEOUS DIPHTHERIA, FATAL PRIMARY CASE. (*Boston Medical and Surgical Journal*, November 10, 1910, p. 730.)

Place reports a case of an infant aged seven months in which two days before admission swelling and redness was noticed over the part of the abdomen and genitals and thighs covered by the diaper. There was considerable thin discharge over this area and the skin was markedly reddened, swollen and covered with a grayish hyalin membrane which was firmly adherent and which when forcibly removed left a granulating area which bled easily. There were no vesicles or pustules. The culture from the skin showed typical diphtheria bacillus. Autopsy showed hyperplasia of the lymphoid tissues and beginning bronchopneumonia and pus in the middle ear.

FRTZ B. TALBOT.

ORTENBERG, SAMUEL: THE RECENT REACTIONARY TEACHING CONCERNING SUMMER DIARRHEA. (*The Montreal Medical Journal*, October, 1910, p. 691.)

According to Dr. Ortenberg the collection of a specimen of urine from an infant is the easiest thing in the world in Finkelstein's clinic, and there can only be regret that his descriptions of the methods used are so vague. He does assure us that the "vessel is not held *in situ* for a few hours by the patient hands of a nurse."

Finkelstein's symptom-complex of intoxication is given as follows:

- (a) Disturbance of consciousness.
- (b) Characteristic alteration in the breathing.
- (c) Alimentary glycosuria.
- (d) Fever.
- (e) Collapse.
- (f) Diarrhea.
- (g) Albuminuria and casts.
- (h) (Sudden) drop in weight.
- (i) Leukocytosis.

The breathing is *pathognomic*. The child "takes heavy, deep breaths that are prolonged and somewhat rapid," which may in grave cases become "of a sighing and panting character."

Glycosuria is nearly always a premonitory symptom of an

acute gastroenteric disturbance. If lactose alone is excreted the prognosis is a good one, but if one of the inverted products of lactose—galactose for instance—is found in the urine the outlook is grave, for it shows that the whole metabolism of the child is deranged.

Intoxication is often caused by too large an amount of sugar. Of the total number of deaths from intoxication experimentally induced, those originating from "Malzsuppe" constituted the greatest bulk. Dr. Ortenberg doubts whether the symptom-complex known as acute gastroenteric intoxication or summer diarrhea or cholera infantum is in the main an infectious or contagious disease. He claims that "the immediate incitative is a factor that has been heretofore overlooked. The presence of glycosuria opens one's eyes to a new view. The defective ureasynthesis, the excessive NH, coefficient, the excretion by the kidneys of the self-same nitrogenous compounds ingested with the food (as proven experimentally)—all point distinctly to a grave disturbance of metabolism with deficient oxidation. Proteid, as well as fat, metabolism is deranged."

Sugar is one of the richest of infant foods. According to Finkelstein each child is individual in its tolerance for sugars. This individual tolerance is often reduced by predisposing factors, such as bad hygienic surroundings, excessive or indigestible diet, etc.

Fat is only less harmful than the sugars. Finkelstein has not been able to demonstrate anything but benefit from the feeding of albumin and casein.

The treatment of the condition of intoxication is outlined somewhat as follows: (1) All food is withheld for twenty-four hours. Water and weak tea are allowed *ad lib*. (2) Stimulation as needed. (3) A cautious return to food. A beginning is made with teaspoonful doses of buttermilk without sugar. Five of these feedings are allowed in the twenty-four hours. On the second day this feeding is given in double quantity. On the third and fourth day an ounce of equal parts of water and buttermilk, to which the casein of one quart of milk is added, is given. On the third or fourth day sugar in small amounts is given. The amount of sugar is gradually raised to 5 per cent., at which time the child should be on its regular feeding. The sugar disappears from the urine at the same time that the nervous symptoms are lost.

M. C. PEASE.

BOOK REVIEWS.

HOOKWORM DISEASE: ETIOLOGY, PATHOLOGY, DIAGNOSIS, PROGNOSIS AND TREATMENT. By GEORGE DOCK, A.M., M.D., Professor of the Theory and Practice of Medicine, Medical Department of Tulane University, and CHARLES C. BASS, M.D., Instructor of Clinical Microscopy and Clinical Medicine, Medical Department of Tulane University. Illustrated with forty-nine special engravings and colored plate. Pp. 250. St. Louis: C. V. Mosby Company, 1910.

In two hundred and fifty pages, Drs. Dock and Bass have presented very clearly and authoritatively the entire subject of this interesting and widespread malady. The book is very well made and easily read, and there is no class of physicians to whom it should not be of great value.

THE DISEASES OF INFANTS AND CHILDREN. By EDMUND CAUTLEY, M.D., CANTAB., F.R.C.P., LONDON. Senior Physician to the Belgrave Hospital for Children; Physician to the Metropolitan Hospital; formerly Casualty Physician and Demonstrator of Physiology at St. Bartholomew's Hospital. Pp. 1,042. New York: Paul B. Hoeber, 69 East Fifty-ninth Street, 1910.

American pediatricists should be grateful to Dr. Cautley and his publishers for presenting to them an excellent and comprehensive text-book representing the most recent ideas of the English school. Dr. Cautley has achieved what must prove a successful work. It is conservative and thorough; there are no illustrations, the author considering them "kindergarten teaching," and apparently every ailment which may affect a child is taken up in some detail. There are many excellent chapters, especially on the heart affections and the diseases of metabolism, in which Dr. Cautley shows himself somewhat farther in advance than most Americans.

THE SURGERY OF CHILDHOOD, INCLUDING ORTHOPEDIC SURGERY. By DE FOREST WILLARD, A.M., M.D. (University of Pennsylvania), Ph.D., Professor of Orthopedic Surgery, University of Pennsylvania; Surgeon to the Presbyterian Hospital,

etc. With 712 illustrations, including 17 in colors. Pp. 800. Philadelphia and London: J. B. Lippincott Company, 1910.

Since the publication of Dr. Kelley's work there have been published a number of text-books on the surgery of childhood, of which the present volume is one of the best. It frankly includes orthopedic surgery, which makes up a large part of the book. It is profusely illustrated, and the illustrations to our mind lend great attraction and value to the work. Dr. Willard's death soon after his book was issued lends particular interest and pathos to it. Readers of it will rejoice that he was permitted before finishing his life's work to put into permanent form the accumulated knowledge of his years of surgical experience, and must also regret that the author did not live to see crowning his efforts the success which it will undoubtedly attain.

INFLUENZAL MENINGITIS.—F. E. Batten (*The Lancet*, June 18, 1910) reports 5 cases, 1 recovering. The diagnosis must rest on the result of bacteriologic examination, for this form of meningitis has no features which distinguish it clinically from other forms of the same disease. Routine cultures of the cerebrospinal fluid must be made on some blood medium. A certain suggestive value obtains in the occasional viscosity of the cerebrospinal fluid, but one would be loath to make a diagnosis on this feature alone. Lumbar puncture has been performed in most of the recorded cases, but it can hardly be considered a therapeutic measure; although recovery has followed in some of the cases in which it was done. In the author's favorable case, as soon as the nature of the disease was recognized, urotropin was given in 10-grain doses every four hours for three weeks. It has been noted that after the use of urotropin within therapeutic limits a sufficient amount of the drug appears in the cerebrospinal fluid to exercise a decided inhibitory effect on the growth of organisms, and will markedly defer, and, in some cases, even prevent, the onset of a fatal meningitis. The favorable result in the author's case cannot be attributed, he says, to the urotropin; but the fact that all other cases in children under two years of age have proved fatal while this one recovered is suggestive and justifies a further trial of the remedy.—*Medical Record*.

RJ

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